THE RAILWAY GAZETTE
A Journal of Management, Engineering and Operation
INCORPORATING
The Railway Engineer · TRANSPORT · The Railway News
The Railway Times · Herapath's Railway Journal ESTABLISHED 1835 · THE RAILWAY RECORD.
RAILWAYS ILLUSTRATED · THE RAILWAY OFFICIAL GAZETTE

PUBLISHED EVERY FRIDAY
AT
33, TOTHILL STREET, WESTMINSTER, LONDON, S.W.1

Telegraphic Address: "TRAZETTE, PARL., LONDON"
Telephone No.: WHITEHALL 9233 (6 lines)

Annual subscription payable in advance and postage free
British Isles and Abroad.....£2 5s. 0d.
Single Copies.....One Shilling
Registered at the General Post Office, London, as a Newspaper

VOL. 67. No. 26 FRIDAY, DECEMBER 24, 1937

CONTENTS

	PAGE
Editorials	1193
Letters to the Editor	1198
Publications Received	1199
The Scrap Heap	1200
Overseas Railway Affairs	1201
The Jamaica Government Railway	1203
New Lightweight Coaches, Eastern Railways of France	1205
Streamlined Tank Locomotives, Lübeck-Büchen Railway	1210
Station Design on the Egyptian State Railways	1212
Railway News Section	1215

DIESEL RAILWAY TRACTION

A Supplement illustrating and describing developments in Diesel Railway Traction is presented with each copy of this week's issue

L.M.S.R. Gift to Imperial War Museum

AN interesting addition to the Imperial War Museum is a model of the steamship *Anglia*, which has recently been deposited with the trustees of the museum by the L.M.S.R. The *Anglia*, one of the several British railway vessels with a noteworthy war history, was an express passenger steamer belonging to the former London & North Western Railway. She was commissioned by the Admiralty as an armed merchant cruiser on August 8, 1914, and served in this capacity until April 24, 1915. Her career as a military hospital ship began on April 25—the following day—and on November 1 of the same year she had the distinction of bringing home King George V after his accident in France. Seventeen days later, the *Anglia* struck a mine laid by the German submarine U.C.5, and sank in shallow water off Folkestone; she was the first hospital ship to be sunk during the war while carrying wounded. All told, 168 lives were lost, including a nursing sister, nine of the R.A.M.C. staff, and 25 of the crew. Of the sick and wounded, 9 officers and 244 other ranks were saved by destroyers and patrol boats. In view of the notable war service of this vessel, the trustees of the museum have gladly found a place for the model, which is accompanied by the Red Cross flag the *Anglia* was flying when she was sunk, and certain photographs of the ship from the collection of King George V. Together with some photographs of the sinking of the ship, this collection is now on exhibition in the gallery illustrating the work of the merchant navy during the war.

The Southern Sales League

On January 1 the Southern Railway will inaugurate the competitive scheme announced in our issue of December 10 to stimulate the selling of travel and transport by the company's servants. Stations in all six traffic divisions of the system will be grouped into leagues, and in every division there will be an annual presentation of shields and cups to its own leagues; and of cash prizes to individual members of the traffic staff for meritorious achievements. Scoring in the league competitions will be based on percentage increases in traffic, every station trying to fulfil its own allotted contribution to the increase calculated for its league as a whole. For 1938 the receipts to be aimed at have been fixed at levels intended to increase the company's passenger and goods revenues by about £250,000 in the year. A monthly publication, *Southern Sales*, will keep members of the staff in touch with their own and their competitors' progress. Few members of the public will grudge either the Southern Railway or the Quota-getters of the L.M.S.R. such extra revenue as they can extract. Some worldly citizens, however, may wonder when somebody will devise a scheme to help them to support such enterprises in the full measure which they deserve.

* * * *

Some Road and Rail Passenger Transport Statistics

Interesting statistics were contained in an address entitled "Some Passenger Transport Problems" given recently by Dr. K. G. Fenelon, Director of the Department of Industrial Administration, College of Technology, Manchester, to the Leeds and District Section of the Institute of Transport. In preparing an estimate of the use made by the public of the means of public transit at their disposal, he found that in Great Britain the average adult makes 300 journeys a year, or nearly twice as many as were made *per capita* in pre-war years. In 1936 the various forms of public transport carried between them some 12,000 million passengers. Of this total, said Dr. Fenelon, motorbuses and coaches accounted for some 6,400 million, railways for 1,300 million (inclusive of season ticket holders), and trams and trolleybuses for the remainder. In that year 280 million train-miles were run and 1,400 million road vehicle miles were operated. Road journeys, however, he said, were predominatingly short distance journeys. He estimated that the average receipt per passenger was under 2½d., while that for third class railway passengers (other than season ticket holders) was 1s. 3½d. Dr. Fenelon stated that the Road Traffic Act, 1930, had not effected a reduction in passenger journeys by road, as these had increased from 5,300 million in 1931 to 6,400 million in 1936; the number of vehicles had increased from 38,000 to well over 40,000

* * * *

The Romance of Cook's

The valued monthly reference publication known as *Cook's Oriental Traveller's Gazette* has just appeared in a new guise as a quarterly magazine known as *The Oriental Traveller's Gazette*, which is not now a book dealing with fares and routes and the more prosaic side of travel, but is a journal devoted to the description of towns, countries, and peoples. One of the striking thoughts resulting from a perusal of this attractively produced Vol. I No. 1 is the contrast between the far-flung organisation now represented by Cook's and the modest beginning of the enterprise ninety-six years ago. An article entitled "The Romance of Cook's" by the present Chairman of the company, Sir Edmund Wyldbore-Smith,

sufficiently demonstrates this point when he recalls that the genesis of the enterprise was a public excursion organised by Thomas Cook, an ardent temperance reformer, by railway from Leicester (his home town) to Loughborough where a temperance conference was being held. This trip, which is claimed as the first railway excursion organised and personally conducted by a private individual, took place on July 5, 1841, when some 570 passengers made the trip—a total distance of about 24 miles—for a fare of 1s. each. For a year or two Mr. Cook acted as the link between the railway companies and local religious bodies wishing to follow the example of the Loughborough excursion, and he was shrewd enough to realise the existence of a wider public demand for such facilities. Progress was rapid and in 1851 Thomas Cook was responsible for bringing no fewer than 165,000 visitors from all parts of the British Isles to see the Great Exhibition. The year 1888 saw Thos. Cook & Son enter the ranks of railway owners by acquiring the funicular which ascends Mount Vesuvius. Although now a separate company this famous railway still forms part of the world-wide organisation which was further strengthened in 1928 by being linked with the International Sleeping Car Company.

* * * *

Forty Winks on the Tube

To those who are accustomed to travel on the London tube railways it seems absurd to speak of the possibility of enjoying a nap during such journeys, especially during the rush hours. Nevertheless, we count among our acquaintances those who are able not only to sleep in such seemingly unfavourable surroundings but who actually feel a pleasure in submitting to the soporific influence of the rhythm marked by the recurrent movements of the carriage. These envied travellers can apparently boast, like Napoleon and other old campaigners, of the ability to sleep and awake at will. They are free of the dread of being "caught napping" and carried beyond their destination. Meanwhile however, they do offer an embarrassing problem to their fellow travellers. What is one to do when the train stops at a station and one's neighbour is obviously fast asleep? The first impulse is to awaken him, but here one may do wrong. We have heard a bitter complaint from a regular passenger on the tube, who occasionally would enjoy a small *siesta*, of those "interfering busybodies" who will insist on awakening him at every station, whereas his destination being a terminus he cannot well be carried beyond it. Our advice to him is to wear a label, but we recognise reluctantly that this can hardly be a general solution for one of the minor problems of an imperfect world.

* * * *

Egyptian Station Architecture

There is something to be said for the plan of rebuilding wayside stations according to one or other of three stock designs, as is described in the article on Egyptian station architecture elsewhere in this issue. The close similarity that is seen in the fronts of multiple shops is not required in railway stations; on the other hand, if buildings are designed to suggest their purpose there should of necessity be a family resemblance between all stations, and on that assumption the argument for stock designs has some weight. But when, as at Kom-Ombo, in the desire to impress local colour on the tourist, the old Egyptian temple motif is dragged from the past and spread along a modern railway platform, a sense of the incongruous is felt. If local colour is to influence design, then the station at Cairo should bear a suggestion of the Sphinx or of the Pyramids, and the idea could easily be reduced to absurdity. The Egyptian State Railways are on safe ground in giving their stations an appearance of solidity, as they have, for it suggests connection with a prosperous concern.

* * * *

Theft Losses on North American Railways

Claims resulting from theft of freight, paid by the railways of the United States and Canada in the first six months of 1937, were the smallest on record, according to the Association of American Railroads. Such claims paid in the first half of 1937 amounted to $302,514, a reduction of $106,061 or 26 per cent. compared with the same period in 1936, and $190,451 or 39 per cent. under the corresponding months of 1935. Of the entire amount paid in the first six months of 1937, claims resulting from the theft of entire packages totalled $155,619; and for theft other than entire packages, $146,895. Since 1920, when freight thefts cost the railways more than $12,000,000 in claims, there has been a gradual reduction, such claims paid in 1937 representing a decrease of 95 per cent. compared with seventeen years ago. This reduction has been due in part to the elimination of delays to cars in yards and terminals, extra police protection of cars containing cigarettes, liquor, and other freight especially attractive to thieves, and to increased efficiency of the railway police.

* * * *

From Shanghai to Southwold

The desperate fighting that has been proceeding over the area between Shanghai and Woosung is a reminder that it was here that China's first railway was laid, being begun in 1875 and finished in 1876. This nine-mile concern, on a gauge of 2 ft. 6 in., was designed to connect the two cities across a loop of the Whangpoo River. But the Celestial mind of that day had its suspicions of this infernal contrivance of the "foreign devils," and in October, 1877, a Chinese mob tore up the track and brought the operation of the Shanghai—Woosung Railway to a full stop. It is a matter of interest that immediately after this, the Ipswich firm responsible for the equipment on this pioneer venture in China, similarly equipped the 3-ft. gauge line, also nine miles in length, between Halesworth and Southwold, giving rise to the legend, which afterwards obtained some local currency that what was not good enough for the Chinese had been palmed off on Southwold! Curiously enough, also, the Engineer, W. G. Jackson, who had been sent out by his firm to China in charge of the first locomotives, and drove the first train from Shanghai to Woosung on the opening day, returned to take charge of the Southwold line, and drove the first train between Halesworth and Southwold.

* * * *

Ventilation or Air-Conditioning

Air-conditioning for railway coaches formed the subject of a paper delivered at a recent meeting of the British Association of Refrigeration. The author, Mr. G. H. Hunt, expressed the opinion that whatever might be the cost of supplying air-conditioning equipment he believed that before very long, discerning travellers in all tropical countries having a first class railway system would expect comfortable conditions similar to those obtainable in moderate climates such as our own. The inference from his remarks was that air-conditioning in Great Britain was unnecessary, but, to the opinion we have just quoted, there was the postscript "This does not exclude the possibility of a simple system of air-conditioning for our own trains suitable for our less severe climatic conditions." If the daily papers are to be believed our climate is always breaking records for extreme heat or extreme cold.

but we agree that, in the absence of sustained high temperature conditions in summer, plant for producing refrigeration on trains must be regarded as a luxury for the dim and speculative future. Mere ventilation, provided that it is carried out scientifically, will in this country usually ensure summer conditions within the comfort zone. How big in itself. though. is the problem of ventilation!

* * * *

Lightweight Coaches on the Est

The Eastern Railways of France have at present under construction a number of all-metal passenger vehicles for suburban services, built on the tubular system, the tare weight of which will be about 12 tons less than that of the existing vehicles of similar proportions. This reduction of weight is being achieved without sacrificing anything in the way of strength of construction or passenger comfort. Only those materials and methods of construction which are compatible with French industrial and economic interests are being used, and, as described in the article appearing on pages 1205-1208 of this issue, various interesting features are embodied in the design of the vehicles. The saving of nearly a third in the weight of the coaches will exert a very considerable and beneficial influence from the operating point of view. We understand that the outlay involved is lower than was expected, the additional cost of each of the new vehicles being about 45,000 francs, of which, broadly speaking, two-thirds are due to the weight-saving measures adopted and a third to increased comfort. In 1934 the question of electrifying the Paris suburban lines was considered by the company, and after a careful investigation it was decided to retain steam traction and build new metal carriages of a weight low enough to avoid the heavy expenditure necessary for new locomotives. The new construction now being undertaken is the result.

* * * *

Wolverhampton Goods District, L.M.S.R.

The area covered by the L.M.S.R. Wolverhampton Goods District is some 750 sq. miles, extending from Soho northwards to Penkridge, reaching Wellington and Coalport to the west, Stourport-on-Severn to the south-west, and Cannock Chase and Lichfield to the east. It embraces a population of about 750,000 and contains not only a heavy industrial district with valuable coalfields but agricultural and moor land. According to *Quota News*, the Journal of the L.M.S.R. Commercial Department, transport needs of this district are catered for by the L.M.S.R. at 51 goods depots in addition to the 200 private sidings serving firms in the Wolverhampton neighbourhood. Some of the varied commodities which are handled are the necessities for and the products of the iron and steel and allied trades of South Staffordshire and East Worcestershire, glassware from the Stourbridge area, and carpets from Kidderminster. A gross weight of 5,060,459 tons of coal was transported from and to this district in 1936. The gross tonnage—mineral and merchandise—during 1936 was 3,604,576 tons, the largest recorded since 1930. To deal with C. & D. traffic, 200 motor units and 300 horses are employed. Traders known to be favouring road transport are not allowed to forget the container service; on an average 850 container loads are forwarded monthly from the district.

* * * *

Locomotive Horsepower

Mr. Robert S. Binkerd, of the Baldwin Locomotive Works, in an article he has written on " The Adaptability of Steam Locomotives to High-Speed Service," remarks that there is an outstanding reason why the steam locomotive within its proper sphere is a more desirable transportation unit than any locomotive the power of which is transmitted to the axles electrically. Given the same load, the resistances to increased speed and forward movement are the same in each case, and must be overcome by drawing upon the horsepower available in the power unit. The horsepower of the steam locomotive is not fixed, but increases with the speed, whereas in the case of an electric transmission locomotive, a constant horsepower is drawn upon. In the latter case, there is in addition the loss of an increasing percentage of the engine horsepower output through resistance to the transfer of that output to the rim of the driving wheels. The net result is that the electric transmission locomotive, with advancing speed, loses its tractive force at a much higher rate than a reciprocating steam locomotive. The author further stated that a comparison made per square foot and cubic foot of space occupied showed that no other form of steam engineering has equalled the progress made by modern steam locomotive engineering; it is indeed an advanced and advancing art.

* * * *

Locomotive Balancing

The author of the paper mentioned above stated that the internal-combustion electric-transmission locomotive had shown to advantage over the steam locomotive in respect of balancing. It is well known that unbalanced weights in a revolving driving wheel result in hammer blows on the track, which in turn cause damage, and increase track maintenance costs. To some degree it is impossible properly to counterbalance the driving wheel of a steam locomotive at every speed at which it could conceivably be operated. Whilst these factors cannot altogether be done away with, the situation is being radically improved. Whenever possible, the effort is made to build locomotives that are well within the track and bridge load limits, and if the Baldwin Locomotive Works were asked to build a heavy high-speed passenger locomotive for an 800- or 900-ton train, it is quite possible that a 4-8-4 design with 31-ton axle loads would be taken as a basis; this could be split into a 4-4-4-4 type locomotive with a 27-ton axle load in a rigid frame, with separate drive for each two pairs of driving wheels, and light connecting rods and short, light, coupling rods. Indeed, an engine has been constructed in accordance with such a design. It is established that a locomotive of this kind would be no harder on the track at 90 m.p.h. than a 4-6-2 engine at 60 m.p.h.

* * * *

A Human Vanity

Tributes to the railway, however unusual, are always welcome. We must admit, however, that we were surprised to hear the roominess of the compartments on a Southern Railway local train praised on the grounds that they allowed passengers " to see their legs." Our own admiration for these members does not go beyond saving them unnecessary exertion by a wise indulgence in cheap fares, and we have not hitherto set a high value upon the extension of facilities for their public display. When feeling the need for intellectual refreshment in a railway carriage, we dutifully admire the pattern of the upholstery, the views upon the walls, and the ingenuity of local wits in converting the " non-smoking " notices into new and strange prohibitions. If, when these pleasures are exhausted, a whimsical fancy turns our thoughts towards the human leg, modesty forbids us to admire our own, and directs our gaze to those of other persons. In such displays, however, the railways have many cunning rivals. It is in revealing to a man his own limbs, in a state of graceful repose while he himself is being urged effortlessly forward, that the railway carriage may cater remuneratively for a pardonable human vanity.

The Reichsbahn Film Service

AS a result of the recent visit* to this country of Herr M. Müller-Hillebrand, Chief of the *Reichsbahn Filmstelle* (German State Railway Film Service), considerable interest has naturally been taken in the work of this important department of the Reichsbahn. The Film Service was established in 1925 with the object of rendering a two-fold service by making instructional films for railway staff and also producing highly-specialised films likely to be of help to research workers in railway laboratories. More recently the publicity or propaganda aspect has assumed an outstanding place in the work of the Film Service, and many films are designed to interest the general public in the activities of the Reichsbahn. In the intervening twelve years over 300 films have been made, and of recent years many of these have been sound films; in fact at the present time the Film Service is making 25 sound films a year. A feature of the work of this department which is not readily appreciated by those unfamiliar with the German cultural organisation is the fact that many films produced by the Reichsbahn are prepared for popular exhibition, and in the last three years no fewer than 35 pictures have been rented for showing in public cinemas. The explanation is to be made in the fact that in Germany the instructional film has always played a far larger part in the eyes of the cinema-going public than in other countries.

The German is keenly interested in scientific development for its own sake and everyone appreciates the regular appearance in an ordinary entertainment programme of a *Kulturfilm* dealing with something instructional, from either scientific or artistic viewpoints, presented in such a way that it does not savour of a school lesson. Actually it is usual to differentiate between the long instructional picture taking an hour and a half to run and forming the principal feature of the whole programme, and the short instructional film lasting only from 12 to 25 minutes. The former is rarely included in a normal cinema programme, although matinee performances and other special occasions including such features are by no means infrequent. The short *Kulturfilm*, however, is an everyday affair in Germany and recent legislation requires the owner of every cinema to show at least 300 metres (a picture of roughly twelve minutes' duration) at every performance. Moreover, if the instructional picture is longer than minimum of 300 metres required by law, the cinema proprietor is given a rebate on the amusement tax for every additional metre of *Kulturfilm*.

Altogether there are in Germany at the present time about 5,200 public cinemas, and the short instructional picture can count on being shown from 4,000 to 10,000 times. This by no means represents the whole of the possibilities for this kind of film, however, for the number of sound film apparatuses owned by private bodies is steadily growing. These are being installed not only in schools and universities, but also by industrial concerns, societies, and associations, and many social and professional clubs and organisations. In fact, so extensive is the activity in Germany in making instructional films that it would be impossible for them all to be shown were there not many opportunities other than those provided by the ordinary cinema. In German schools alone there are 19,000 silent film apparatuses giving public and private performances of distinctly scientific character and making no concessions to the standards and requirements of lay audiences. To these the Reichsbahn supplies films direct, and during the past twelve months has arranged for about 20,000 of such performances supplying the films free of charge. A film catalogue classified under subjects is published periodically listing the 140 different subjects available; more than one print is kept in stock where necessary, and in all some 900 copies of films are in circulation. Furthermore, the Reichsbahn possesses 36 sets of talking film apparatus and many silent projectors which may be loaned in addition to the films for use where suitably-equipped halls are not available. It will thus be seen that the *Reichsbahn Filmstelle* is responsible for important propaganda and instructional service to the general public, in addition to its original purpose of serving to educate railway staff and assist the activities of the research worker.

* See THE RAILWAY GAZETTE of November 26, pp. 906 and 941.

* * * *

Queensland Government Railways

THERE was a considerable improvement in the financial results of the Queensland Government Railways for the twelve months ended June 30, 1937, as is shown by the report received from Mr. J. W. Davidson, Commissioner for Railways. The advance of £384,717 or 5·86 per cent. in the total earnings was principally due to greater railages of cattle to meatworks and increased wool production consequent upon better seasonal conditions in the pastoral areas. Other contributing factors were increased traffic in general merchandise occasioned by the greater prosperity of the State, a record production of sugar, greater activity in the building trades and timber industry, demands of industry for more coal, and greater mining production generally. Working expenses were greater by £241,059 or 4·73 per cent. due to the increased traffic, additional payments to the staff on account of the rise in the basic wage, the percentage easement of salary reductions, award variations, automatic increases in salaries and wages, etc. Net earnings were, in consequence, £143,658 higher, and represented a return of 4¼ per cent. on capital of opened lines, as compared with £3 18s. 7d. per cent. for the previous year. Interest charges (£1,606,432) increased by £18,035, and the final result of the year's operations was a profit of £7,872, against a deficit of £117,751 in the year 1935-36. Operating figures are compared as follow:—

	1936–37	1935–36
Miles open	6,467	6,467
Passenger journeys	25,444,438	25,158,926
Goods and minerals, tons	4,474,548	4,234,877
Train-miles	12,846,622	12,277,204
Operating ratio, per cent.	76·77	77·60
	£	£
Passenger revenue	1,446,773	1,469,556
Goods and minerals, receipts	4,186,203	3,889,868
Total earnings	6,949,677	6,564,960
Working expenses	5,335,373	5,094,314
Net earnings	1,614,304	1,470,646

Against an increase of £5,568 in suburban passenger earnings there was a fall of £28,351 in earnings from country travel, including a decrease of £21,651 in first class receipts. Improved second class accommodation has probably caused some transfer from the country first class, but the greater part of the loss appears to be due to an increase in air travel, and to the greater use of private motorcars owing to the increased mileage of good roads. Suburban first class receipts further diminished by £889. In parcels and miscellaneous traffic receipts (£678,501) there was a decrease of £5,286, chiefly because of dry weather conditions in the principal dairying districts and of the extension of road motor services for the conveyance of cream direct to factories. There was a further fall in the C.O.D. business, caused partly by the establishment of chain stores in country towns. Tonnage of goods and minerals increased by 239,671 tons or 5·66 per cent., bringing an increase in revenue of £296,335 or 7·62 per cent. General merchandise earnings (£1,719,572) advanced by £86,262 or 5·28 per cent., and in the livestock

receipts of £638,200 there was an improvement of £116,451 or 22·32 per cent.

The Royal Commission on Transport, which had been appointed towards the end of 1936, has reported that it was not in a position to make any recommendation contrary to the claims of the Commissioner for Railways that no branch line should be closed. The Royal Commissioners are also of opinion that the container system will not be employed to any considerable extent in Queensland until the size of individual consignments assumes much larger proportions than at present. Two new mail trains of a design very similar to that of the Sunshine Expresses are being constructed, and two new suburban trains equipped with roller bearings have been placed in service. Four more B18¼ superheated passenger engines were brought into use during the year under review. Four new diesel 102 h.p. streamlined motor trains of improved design have been in course of construction and two additional diesel railcars were placed in commission during the year. An additional 121½ route miles of line have been brought under the train control system, which now embraces 844 miles of line. Automatic light signals were installed during the year on a 4-mile section between Eagle Junction and Brisbane Central stations. Bridge strengthening between Bowen and Townsville in the Northern Division has been continued. Relaying was carried out during the year on 64 miles of line, ten miles of which were relaid with 80 lb. rails and the balance with 60 lb. rails.

* * * *

Conveyance of Meat by Railway

THE British railways convey vast quantities of meat annually, something like 1,500,000 tons being imported in a chilled or frozen condition, and about one million tons being home-killed. Rapidity of conveyance and speedy delivery are obviously of very great importance in getting the meat to the consumer in first class condition, and the railway companies have made considerable progress in recent years in minimising handling, preserving suitable temperatures *en route*, and avoiding exposure of this important traffic to outside temperatures. In the case of the home-killed meat, the animals are specially fed for marketing and are conveyed to slaughterhouses from which the meat is loaded direct into suitable containers or special meat vans. A number of licensed slaughterhouses, situated at railway stations, are let at nominal rentals, the companies providing the necessary equipment. A substantial proportion of the home-killed meat is dispatched in special ventilated containers. These are equipped with bars and hooks on which short sides of beef and carcases of mutton can be hung in freely circulating air. Insulated containers, with insulating material on the roof, floor and sides, are also used. Other containers have roof tanks for water ice or other refrigerant to be inserted. Insulated refrigerator vans with tanks for water ice and continuously braked for running in express freight trains are also provided, and, like the containers, are fitted with bars and hooks for suspension of the meat.

A heavy flow of home-produced meat passes regularly to Smithfield market, London. Several railway stations are situated very near this market, that of the G.W.R. is situated actually underneath it so that meat is transferred direct by lifts. Extensive railway facilities for handling imported meat have been provided at ports throughout the country. Railway research into the best methods of ensuring that meat reaches its destination with the minimum of deterioration in transit is continually proceeding in collaboration with the meat trade generally. One of the latest developments has been the use of solid carbondioxide or "dry ice" instead of water ice to maintain the meat at a low temperature. This refrigerant, instead of becoming a liquid like water ice, evaporates during the course of refrigeration and forms a gas which leaves no moisture. It has been successfully used in the conveyance of sausages, rabbits and similar perishable commodities, and its use is steadily being extended.

* * * *

The Railways of Hungary

THE Minister of Transport and Commerce, Mr. Bornemisza, has issued a statement on the working of the Hungarian State Railways during the last three years. He states that the number of passengers carried rose from 60·5 to 71·5 millions per annum, and the volume of freight from 14·8 to 19·2 million *tonnes*, receipts increasing from 197 to 246 million pengö, chiefly from freight. Expenses rose from 261 to 293 million pengö, the deficit falling from 63·8 to 47 million pengö. The true deficit is, however, only 27 millions, 20 millions being absorbed by capital repayments. Wages and pensions are now absorbing 75, and loan charges 30 millions. From 12 to 13 million pengö annually have for some years been spent in improvements; this year 26·8 millions are allocated thereto, principally to renewal of rolling stock, track, station and signalling alterations.

Trade improvement has had much to do with the change, but an energetic rates policy and the provision of better facilities has assisted. Hungarian products are finding a better sale abroad, due to the introduction of more refrigeration and other special wagons. Freight trains have been accelerated by the adoption of continuous brakes. Some 800 wagons of fruit and vegetables were sent to other countries last year. Road competition is being met, and the agreement with the road hauliers' association, the Mateosz, has had excellent results. Improved train connections and better through carriage arrangements have led to increased foreign traffic, and a large number of special international trains have been run in connection with visits of various societies, institutions, &c. Fare reductions in inland traffic have encouraged excursionists, and there has been a great increase of visitors to the resorts on Lake Balaton. The reduction in journey times has also been helpful. The times of fast trains to Vienna have been reduced by 40 or 50 min., and an hour more is saved by the express railcars, with similar savings on other routes. A streamlined express now covers some sections at 120 km.p.h. (74·5 m.p.h.). The railways road motor undertaking, the Mávaut, has done excellent work as a feeder, and now operates on a route mileage of 4,838 km. (3,006 miles) and conveys 1¾ million persons annually.

Railway equipment has been greatly improved. Owing to a marked increase in the price of timber, steel and concrete sleepers are being increasingly used. Many important sections are being relaid. The re-arrangement of the Budapest stations is being carried out as funds allow; some sections are to be abandoned, and Josefstädter is to be converted into a passenger station. The Süd station is to be closed and a new one built between the Kelenföld station and the Lenketér bridge. Among important bridge reconstruction works are the Danube bridge at Baja and the Theiss bridge at Csongrád. The work done by the railways is of great importance to the industries of Hungary, for some 50 million pengö are spent on material annually. The steamer services on Lake Balaton are also important, and their financial position is improving. The Minister has expressed the appreciation of the Government for the work done by the General Manager of the railways, Dr. Senn, in carrying out so extensive a reorganisation scheme.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

L.N.E.R. Locomotive No. 10000

Heathside, Malvern Common,
Worcestershire, December 12

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—With reference to the question of using the notation 4-6-2-2 for the above, surely it is expecting too much of the formula to use it to indicate independent carrying axles. For that matter even to show the absence of coupling rods may lead to confusion.

As an extreme case I would cite Gooch's famous broad-gauge singles, and Webb's "Greater Britain's." The former had two independent carrying axles at the leading end, the latter two sets of independent driving wheels. Both these totally different types might therefore have been written 2-2-2-2, which, as Euclid would have said, is absurd.

It seems to me that the notations 4-2-2 and 2-4-2 respectively give a better idea of the engines, and on this basis the use of four (or more) numerals could be kept for articulated locomotives.

Yours faithfully,
H. C. WALLACE

King's Cross and Yorkshire

London, W.6, December 10

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—The recent inauguration by the L.N.E.R. of that fine train, the West Riding Limited, while unquestionably providing an excellent business travel facility, has brought some measure of disappointment in that opportunity was not taken at the time of effecting other improvements in the fast train service between King's Cross and Yorkshire. The West Riding Limited has naturally injuriously affected the patronage of its predecessor the Yorkshire Pullman, which at present is also giving a very ill-balanced service. This Pullman train might, with great advantage, be transferred to an entirely new and most useful sphere of work—that of providing the much needed down early morning and up late evening business service between London and Yorkshire. I suggest the following schedule:—Down: Leave King's Cross 8.30 a.m. Arrive Doncaster 11.6 a.m., Wakefield 11.38 a.m., Leeds 11.58 a.m., Hull 12 noon, Bradford 12.15 p.m., Harrogate 12.30 p.m., Halifax 12.42 p.m. Up: Depart Halifax 5.40 p.m., Harrogate 6.0 p.m., Bradford 6.10 p.m., Hull 6.28 p.m., Leeds 6.30 p.m., Wakefield 6.50 p.m., Doncaster 7.23 p.m., arrive King's Cross 10.0 p.m.

A few of the present latest business departure hours are from Halifax 4.29 p.m. (change Holbeck), Bradford 5.10 p.m., Leeds 5.30 p.m., Hull 5.5 p.m. The advantages of this proposal are obvious; some of the disadvantages are: Hull and Harrogate would lose thereby a useful, fast and comfortable morning service to London; the fairly well patronised Yorkshire express leaving King's Cross at 4.45 p.m. would disappear. To compensate the latter point, I suggest that the present 1.3 p.m. arrival at King's Cross (9.0 a.m. from Leeds) should be returned as a high-speed train, taking up the schedule and departure time of the Yorkshire Pullman and splitting up in the same way at Doncaster and Wakefield. Restaurant car facilities would of course replace the present buffet car. As regards Harrogate passengers, they would be amply compensated were the West Riding Limited divided at Leeds, part serving Harrogate and part Bradford. This seems quite a reasonable demand as the train is usually less than one-third full between Leeds and Bradford.

Hull would get its due in a different manner, being embraced in a further proposal I have in mind. Huddersfield has come out a good deal the worse from the Midland timetable reorganisations, and correspondence in *The Railway Magazine* has shown that it is possible for one to see a friend off on the 10.30 a.m. from that town (the principal London morning service), have half an hour for business, drive by car to Leeds, catch the West Riding Limited and arrive at King's Cross *forty minutes before* the Huddersfield train arrives at Marylebone. It is surprising also that the high-speed possibilities of the level and once very well patronised Great Northern route between King's Cross and Sheffield have not been exploited by the L.N.E.R.

Collecting these rather scattered observations on Hull, Huddersfield and Sheffield services together, what I should like to see would be a new streamlined train leaving Huddersfield at 10.25 a.m., Sheffield (reached via Penistone) at 11 a.m., arriving Retford 11.25 a.m.; picking up there a portion leaving Hull at 10.20 a.m. and Doncaster 11.5 a.m.; leaving Retford at 11.30 a.m., and arriving King's Cross 1.30 p.m. There could hardly be any doubt that this train would be enthusiastically received. The schedule I think would be quite practicable, and would give the excellent times to London of (*a*) from Sheffield, 2½ hr. (with one stop), as compared with the recently instituted best of 2 hr. 52 min. (non stop) over the Midland route; (*b*) from Huddersfield 3 hr. 5 min., compared with what I believe to be the best of 4 hr. 10 min. over the G.C. route; (*c*) from Hull 3 hr. 10 min., against 3½ hr. at present. The new train would pass the 1.47 p.m. arrival at King's Cross at Peterborough without materially interfering with the schedule of the latter train. The return "flyer" would depart from King's Cross at 5.45 p.m. on the same schedule as on the up journey. Finally as such a train would very worthily deserve a name, I would suggest "The Flying Yorkshireman" which would readily stay in the minds of those accustomed to The Flying Scotsman.

Yours, &c.,
"VITESSE"

French Locomotive Superiority

Reading, November 25

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In the pages of *The Railway Magazine* and THE RAILWAY GAZETTE there have appeared from time to time details of phenomenal performances by the Paris-Orleans Pacific and 4-8-4 locomotives. They have aroused widespread interest among locomotive enthusiasts in this country, but it is an extraordinary fact that so far no attempt appears to have been made by the proper authorities of our leading railways to investigate the reasons for these performances, or to adopt the points of design which appear to be the main contributory causes of the immense superiority of these locomotives to those of practically corresponding weight in this country. I believe it is a fact that the designer of these engines is a specialist employed to spend his time and abilities entirely at his job, untrammelled by the multitude of general engineering and administrative duties which beset the chief mechanical engineers of our railways over here. The following characteristics are apparently largely responsible for the success of these wonderful machines, and I put them in the order in which I think they may contribute to this success:—

(1) The designing of all steam pipes and passages (especially exhaust) to eliminate friction of steam against the walls and reduce back pressure.

(2) The adoption of a double blast pipe to reduce back pressure.

(3) The use of high steam pressure (240 to 290 lb. per sq. in.) and high superheat. The engines are of course four-cylinder compounds.

(4) The use of poppet valves and special valve gear.

(5) The use of a thermic syphon for heat distribution.

I have records of these engines exerting a drawbar pull of 16,000 lb. at 60 m.p.h., giving a drawbar horsepower nearly double that of the best I can find in this country. So the old question crops up once more "what are we going to do about it?" and the answer can come only from the directors and mechanical engineers of our railway companies.

Yours, &c.,
H. R. SUTTON

PUBLICATIONS RECEIVED

The Republics of South America. Prepared by a Study Group of Members of the Royal Institute of International Affairs. London: Oxford University Press, Amen House, Warwick Square, E.C.4. 9¾ in. × 6½ in. × 1½ in. 374 pp. Folding maps. Price 21s. net.—Before reviewing this instructive and well-produced volume, it may be mentioned that Mr. W. Howard-Williams, C.B.E., Chairman of the Central Argentine and a Director of other S.A. railways, participated in the early stages of the work of the study group, and gave it the benefit of his wide experience and knowledge, and much valuable help was also received from Sir Follett Holt, K.B.E., Chairman of the Buenos Ayres Great Southern, B.A. Western, and other companies.

This work helps to fill the gap or dearth of books in this country giving a general description of South America today. It is a political, economic, and cultural survey of the republics, and is divided into three parts. Part I deals with the physical and geographical aspect, including temperature, climatic, and rainfall conditions, the development of communications, composition and distribution of population, and history. Part II covers economic development, land, labour, and social questions, trade and industry. Part III outlines education and cultural development, religion and State and external relations.

Chapter II, Communications, after describing their general development, and waterways, has 10 pages devoted to the railways of the 10 republics, of which there are some 62,000 route-miles. Of this mileage 43 per cent. is State- or provincially-owned, and 57 per cent. privately-owned. For purposes of description, the railways are divided into three groups: (1) those of Argentina, Uruguay, and Paraguay, (2) in Brazil, and (3) in the Andean republics. In group (1) the Buenos Ayres Western and Buenos Ayres Great Southern were the first two railways, but gauge problems soon stultified further development, though only for a time. Between 1905 and 1915 expansion was 76 per cent., but it then dropped to 7 per cent. during the subsequent 10 years. The history of the railways is brief, but is brought quite up to date as, for instance, by recording the rebuilding and intended purchase of the Transandine Railway by the Argentine Government. Mention is made of the plight of the railways during the depression and the modified Government regulations.

Unlike Argentina, Brazil is geographically unfavourable to railway expansion. Consequently, its systems or groups of systems are detached, and the mileage per sq. km. is very small. The configuration of Chile originally entailed short detached lines, but these have subsequently been linked up by the longitudinal trunk line. The enterprise of this State is reflected in the 15 Chilean transandine projects. The brilliant engineering feats in the construction of many of the South American railways is referred to, notably the transandine and trans-Cordillera lines, with their summit levels from 10,000 to 15,000 ft. above sea level. Roads and airways are more briefly dealt with, and there is a rather crude sketch map at the end of the chapter roughly indicating the positions and gauges of the various railway systems in the different republics.

Civil Engineering Design, Types and Devices. By Thomas W. Barber. London: The Technical Press Limited, 5, Ave Maria Lane, Ludgate Hill, E.C.4. 8½ in. 254 pp. Illustrated. Price 12s. 6d. net.—This is neither a treatise, a text book nor a descriptively written work, but is, as its sub-title states, "A classified and illustrated index of plant constructions, machines, materials, means and methods in use in civil engineering works of every class," and is, in fact, a third revised and enlarged edition. Each of the subjects enumerated in this index is illustrated by a sketch or line-drawing, of which there are stated to be 1,500 in the volume. A name only, or very brief description—usually only one line of text—accompanies each sketch. Some of the subjects included, such as cast-iron girders and arches, and the names of others, *e.g.*, "cross-over turnout on skew bridge" and "ditto under main lines," describing respectively a flying and burrowing junction, are hardly in accordance with modern engineering practice or nomenclature respectively, and are, no doubt, relics of the first edition of the book (date unknown), but this illustrated compendium is extraordinary in the wide area it covers in all branches of civil engineering, and may be of very considerable value, especially to the engineering student. The sketches are well executed and reproduced.

Protestant Travels in France.—The epic story of the struggle for religious freedom by protestants in France is recalled by a very interesting booklet entitled "Protestant Travels in France," which we have received from the Centre National d'Expansion du Tourisme, du Thermalisme et due Climatisme. As Monsieur Roland-Marcel, the French Commissioner General of Tourism, under whose auspices this booklet has been published, states in the foreword, the process of winning freedom of conscience has witnessed some of the finest and most dramatic episodes in the national history of France. How deeply rooted in the country was protestantism and how bitter the struggle, the reader is made to realise in this well printed and profusely illustrated publication, which may be obtained free from the French Railways—National Tourist Office, 179, Piccadilly, London, W.1. The programme covers the whole of France, from north to south, from east to west; from Etaples, on the Channel coast, where Lefèvre, the initiator of the Reformation, was born, to Nérac, where he died in the château of the Queen of Navarre; from Strasbourg, where the first French Reformed Church was built in 1538, to Nantes, where, in 1598, Henry IV allowed the Huguenots freedom of worship, and La Rochelle, where, after defeating them in 1628, Richelieu inaugurated his policy of religious tolerance. The sites and monuments to which attention is invited are of the most widely varying description: palaces and feudal castles; bourgeois homes; humble cottages and inns; prisons; river-banks, highways, and byways.

Model Railways and Equipment.—A catalogue of inexpensive model railways and equipment in the 1¼ in. gauge is published by Meccano Limited, Binns Road, Liverpool, with the title "The Hornby Book of Trains." Interest in railway matters is stimulated by the illustrated introductory section, dealing with famous trains, the daily work of locomotive depots (based on current L.M.S.R. practice), and engine building. Many of the catalogue pages are in colour, and list complete train sets and separate model railway accessories in the now extensive Hornby series.

The Brown-Firth Research Laboratories.—Although criticism has been levelled in the past against manufacturers in Great Britain for their unwillingness to devote adequate personnel and money to research, as compared, say, with the intensive research carried on in Germany, during the last decade or so any lack in this direction in Great Britain has been largely made good. The handsome volume here reviewed describes and illustrates what is now being done in metallurgical research by the combined firms of John Brown & Co. Ltd., Thos Firth & John Brown Limited, Firth-Vickers Stainless Steels Limited, and Firth-Derihon Stampings Limited, in their extensive laboratory building at Sheffield. Included in the equipment are laboratories for experimental steel-making, heat treatment, pyrometric work, high temperature mechanical testing, metallography, microscopy, fatigue and other forms of physical testing, corrosion, high temperature oxidation, the study of gases and inclusions, X-ray work, refractories, and, of course, chemical analysis, together with a museum and a comprehensive library; all are described and illustrated, and a complete catalogue of the library contents is also given. A testimony to the value of the research carried out here is provided by a list of the improvements in iron and steel manufacture which have been brought about as a result of the work of the laboratories, and of papers which have been produced by the staff on metallurgical subjects, for the benefit of iron and steel manufacturers and users at large.

THE SCRAP HEAP

GREETINGS TELEGRAMS

The decorative form of the greetings telegram and its golden envelope continue to grow in popularity. During the past 12 months nearly 3,000,000 greetings telegrams were handled by the Post Office. This month the Post Office has replaced the former form with a newly-designed greetings telegram form. Mr. Trefor Owen Jones, the artist, has achieved in his design a winter scenic effect set in a frame of pleasant deep colours and fine line work of gilt. Greetings telegrams are now being sent at the rate of more than 50,000 a week.

* * *

THE WHISTLER

"Moaning and bellowing, the ship felt her uneasy way from Dover to Calais recently, a dense fog prolonging the Stygian crossing to one of nearly five hours. Memories of a shipwreck on the rocky cliffs of Ithaca rose to haunt me, and apprehension was my companion. Suddenly, cutting through the obscurity, the mournful booming, sweet, sharp, carefree, a boy's cheerful whistling was heard. Just an uppity ippity tune, but anxious faces cleared, the tension of one's thoughts relaxed. Bless, I say, the cheerful whistler who pipes his little tune so blithely."—*From a letter by Winifred Gordon to "The Times."*

* * *

A crowd of wistful travellers to an unknown destination, bearing Christmas gifts for they knew not whom, took a special train out of New York last year at Christmas time. It was the Lonely Heart Special, designed by the New York Central to provide a holiday trip for young people who might otherwise be left lonesome in the city. Christmas dinner was served at Pittsfield, Massachusetts; there were entertainers aboard the train, and agents of the road distributed little Christmas trees and other appropriate gifts.—*Boyden Sparkes in "The Saturday Evening Post."*

* * *

Tornadoes visited the North Western States of America on Monday, June 13, 1883, and Beloit, Wisconsin, was badly damaged. A goods train on the North Western Railway at Elmo, Wisconsin, was blown from the rails and carried some distance. It was entirely wrecked, and two men were wounded.

* * *

Telegraph poles, like sleepers and rails, require constant renewal and, in common with the railway sleeper, they vary considerably in their powers of durability. Generally speaking, the average life of a telegraph pole is about thirty years, but 318 creosoted poles erected in 1848 between Fareham and Portsmouth when taken down in 1883 were discovered to be as sound as when erected. The longevity of poles is dependent to a great extent upon the period in the tree's growth at which it is felled, and also upon the composition of the preservative employed to protect it after it has been hewn and shaped. The supply of telegraph poles is obtained mostly from Scandinavia, where they are cut from red fir trees. Occasionally, American pitch pine is used, but the cost is much greater than that of the Norway fir round pole.

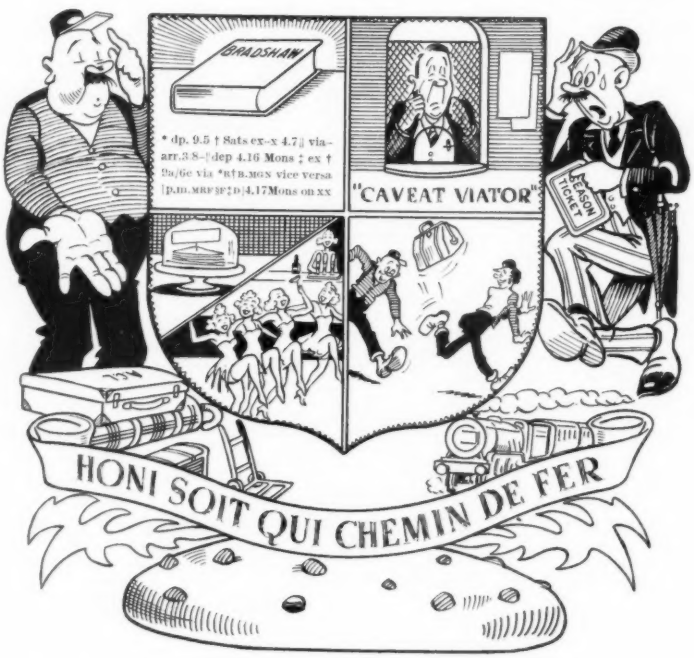
* * *

"Men's wits get quickened by the sharpness of the play, and sparks will be emitted," said *The Illustrated London News* of November 8, 1845, in writing of the Railway Mania, and in proof quoted the following. "A person, a short time back, who sat smoking his cigar and vaguely wondering what he should do next, as to his independence and his pressing landlady, found a line in the Railway Act which dragged him out of the Slough of Despond. He saw 'that all Railways must be advertised in the county paper so many times before being brought before the House.' The county in which he sat had no paper! Lucky thought! He had no capital, but a capital idea; printing was cheap, paper was cheaper. Hey presto! a county paper was published; he mildly insinuated the necessity to the thereabout Railway Committees of sending in their advertisements to him, at his own price, as they could not pass without paying toll, and his was the only turnpike! Spirits like these must float, at least while the hubbub lasts, and the cauldron boils; but when the fire of speculation goes out, and the stuff cools, there will be a confounded lot of dregs, which will leave a disagreeable taste in the mass, and take much care and time to purify."

* * *

The vicar of Doncaster, on Monday morning, at half-past five, in dark, damp, and dismal weather, was noticed standing at the coffee-stall near the chief entrance to the Great Northern Railway Plant Works, sending cups of hot coffee to the workmen. Mr. Flyn is an ardent promoter of the temperance movement, and the stall in question is in connection with the Church of England Temperance Society. — *From "The Church Times" of December 7, 1877.*

Suggested Armorial Bearings—The British Railways



FIRST QUARTER. The Book of the Law, with extract from its original Greek.
SECOND QUARTER. Office of the Booking, with caged clerk rampant and suitable inscription "Caveat Viator" (Passenger, watch your step).
THIRD QUARTER. Shrine of Bacchus with Nymphs dansant, and with Staff of Life—rock hewn and glass domed.
FOURTH QUARTER. Excerpt from the Olympic games or luggage athletes at termini and elsewhere—the tossing to and fro of bag and baggage.
Supporters - Sinister—Portitor Brittanicus (A British Porter) with hand puissant for carrying luggage and receiving of largesse.
Dexter—Civis Brittanicus—holder of Season, Period, Ex-curse-on, Travel Ordinary and Extra-ordinary.

The whole resting upon the solid foundations of a Railway Bun—with motto "HONI SOIT QUI CHEMIN DE FER" (Evil be to him who says anythin' against the Railways!)

A trader's suggested railway armorial bearings

Reproduced from "Brymill Magazine," the organ of British Rolling Mills Limited

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

SOUTH AFRICA

Staff Associations' Agreement Amended

As a result of the discussions between the Minister of Railways and representatives of the various staff associations recently, the 1936 agreement, referred to in THE RAILWAY GAZETTE of September 4, 1936, has been amended as follows:—

(1) "The responsibility allowance referred to in Clause (2) of the agreement will be permanently merged into substantive salaries and wages with effect from November 15, 1937.

(2) "The administration will immediately put into operation the ownership housing scheme as set out in the report of the Housing Commission recently appointed, due consideration being given to the cases of railwaymen who own their own houses, or who have concluded arrangements for the acquisition of their own houses.

(3) "In the case of staff who are paying rentals in excess of one-fifth of their substantive emoluments, they will be entitled to submit their cases for consideration in respect of the difference between that amount and the rent of the dwelling they occupy, subject to the terms and conditions agreed upon between the administration and the joint staff organisations.

(4) "On the assumption that higher house rents may have forced up the cost of board and lodging, the administration shall undertake an investigation into claims for relief submitted by servants who reside in boarding houses with a view to ascertaining the extent, if any, to which they should be assisted."

An honourable understanding has been arrived at between the Minister and the delegates to the following effect:—

(1) "The delegates undertake, as far as their respective organisations are concerned, to discourage any agitation or representations in connection with the above matter subject to the provisions of Clause (2).

(2) "The Minister undertakes to endeavour to obtain representation for the railwaymen on any commission which may be appointed by the Government to investigate the costs and/or standard of living. The Minister was not prepared, however, to admit that the cost of living warranted consideration of an allowance at this stage for which the delegates pressed.

(3) "In case other Government servants are granted any allowance in respect of the cost and/or standard of living, the Minister undertakes that the railwaymen will receive any difference between such allowance and the benefits conferred by the amendment to the 1936 agreement."

Airways Expansion

At the beginning of next year it is intended to operate three services a week to Northern Rhodesia—instead of one as at present—in conjunction with the Rhodesia and Nyasaland Airways, which will also operate three return services a week to the Rand. In addition, a daily service will be operated along the coast between Cape Town and Durban and *vice versa*. A daily service between the Rand and Cape Town via Kimberley and Beaufort West will gradually be introduced. It is also intended to operate a passenger service from the Rand to Lourenço Marques in conjunction with the Portuguese authorities, who have recently placed an order for three 14-seater JU 52's, and are at present having pilots and ground engineers trained at the Rand airport. Two ten-seater J.U.86's are due to arrive, and it is hoped to place them in service on the Rand-Port Elizabeth route on December 1.

A Circular Route

A service will also be inaugurated next year from the Rand through the Bechuanaland Protectorate, calling at Palapye Road and Maun, to Windhoek, to connect with the West Coast service to Loanda, Boma, and Leopoldville and across Africa, south of the equator, to Kisumu to link up with the south-bound service thence to the Rand via Kenya, Tanganyika, and the two Rhodesias. Additional direction-finding stations are to be erected at Bloemfontein, Mossel Bay, Windhoek, Nelspruit, and Palapye Road. When the station is erected at Mossel Bay, this centre will be made a regular stopping place for the coastal air liners on the present long hop of 423 miles between Cape Town and Port Elizabeth. When the new stations are in full working order, the whole of the Union will be properly triangulated for directional wireless operation so that aircraft flying along any one of the scheduled air routes will be able to obtain bearings at any time.

The Lorenz blind landing and approach system, which has been erected at the Wingfield aerodrome at Cape Town, has given satisfactory results. A Junkers F13 has been specially fitted with the Lorenz receiver equipment, and preliminary experiments prove that the most sanguine expectations held out for this mechanical aid to landing aeroplanes "blind" will be realised. If the installation at Cape Town proves the success anticipated, further systems will be erected at Port Elizabeth, East London, Durban, and possibly Mossel Bay.

BRAZIL

Central Railway Extends Policy of Constructing its own Locomotives

Encouraged by the construction and success of the Pacific locomotive, No. 345, referred to in THE RAILWAY GAZETTE of May 7, 1937, and in response to the demand of the General Manager of this railway, the Minister of Transport has requested the President of the Republic to grant a special credit of 6,702 contos for the construction of five more locomotives, and the rebuilding of three others. After pointing out the necessity of liberating the railway from its dependence on foreign manufacturers, and, *ipso facto*, avoiding the exodus of capital, it was stated that the cost of building five locomotives of the Santa Fé type would be 3,455 contos, and the conversion of three Mallet engines to Santa Fé type would cost 1,247 contos, plus an additional sum of 2,000 contos required for the adequate equipment of workshops.

Receipts on this railway, for the first eight months of the current year, totalled 144,536 contos, or an increase of 17,455 contos compared with the same period last year.

New Lines

The Sorocabana Railway has begun the construction of a new branch line from Bury to Capão Bonito, a distance of 22 km., through virgin forest. An extension from Iguaba Grande to Cabo Frio, on the Maricá Railway, was officially opened to traffic on September 11. The Jaguary-Santiago do Boqueirão-S. Borja branch, on the Viação Ferrea do Rio Grande do Sul, has been officially opened to traffic. Platelaying from both directions met at Iguarica, and the last spike was driven by General Manoel Vargas, father of Snr. Getulio Vargas, President of the Republic.

A Decree has been signed, sanctioning the resolution of the Legislative Body, and authorising the opening of a special credit of 1,000 contos of reis for the construction of a new branch line from Caroatá to Pedreiras, in the State of Maranhão.

INDIA

Prevention of Railway Labour Disputes

As a result of careful examination of the question of providing additional machinery for the prevention of disputes on railways, in the light of the views expressed by the Royal Commission on Labour and by the Indian Railwaymen's Federation, the Government of India has announced the appointment of a special Conciliation Officer at Calcutta as an experimental measure for one year. The Conciliation Officer will maintain contact with the railway administrations with which he is concerned, with the recognised trade unions representing the employees of these railways, and with area committees, workshop staff committees, railway councils and other bodies directly concerned in the relations between the railway administrations and their employees. In the event of an actual or threatened dispute, the Conciliation Officer will endeavour to effect a settlement between the parties, and will at other times use his good offices to maintain harmonious relations. He will be responsible to the Government of India in the Department of Labour.

When the Conciliation Officer has organised his work, the Government of India proposes to set up an Industrial

Advisory Board consisting of a Chairman and two members selected by the Chairman, as the occasion requires, from a panel appointed by the Government of India. This board will deal with disputes referred to it by the Conciliation Officer, and its decision will normally take the form of a report to the Railway Board or the Agent of the railway concerned, with recommendations where necessary.. It will be open to the Chairman to suspend the inquiry if, during its pendency, a stoppage of work should take place.

Lieut.-Col. H. W. Wagstaff, till lately attached to the Railway Board as Supervisor of Railway Labour, has been selected for the appointment of Conciliation Officer, and will begin work early in December. His duties will extend to the East Indian and Eastern Bengal Railways. Sir Zahir Suhrawardy, President of the Railway Rates Advisory Committee, has agreed to act as Chairman of the proposed board. The estimated cost of the scheme is Rs. 50,000, equivalent to £3,750, per annum.

Conference Between Railway Board and Railwaymen's Federation

At the half-yearly meeting between the Railway Board and the All-India Railwaymen's Federation, Mr. Jamnadas Mehta, President of the federation, referred to various disabilities of railway employees. The federation submitted that the Wedgwood Committee's observations regarding the subordinate supervising staff were unfair. The recognition of unions, the acquisition by the State of company-managed railways and the extension of provident fund membership were advocated. Sir Guthrie Russell gave the federation a sympathetic hearing. He mentioned that the State-managed railways had already recognised those unions which were representative of the staff, and assured the federation that the training of Indians in technical branches would continue, though a certain amount of recruitment of European supervisory staff was necessary. The purchase of company-managed railways was a matter of major policy which, he said, would be considered in due course. In regard to the extension of provident fund membership, the Chief Commissioner stated that unless there was some certainty of a sustained increase in railway earnings, it was undesirable to launch upon a scheme involving substantial expenditure.

FRANCE

Increases in Fares and Rates as from January 1

When the National Railways Company takes over the country's railway systems on January 1, further increases in passenger fares and freight rates will come into force. These increases are necessary because the company is compelled to balance its budget according to the terms of Article 18 of the Decree dated September 1, under which it was constituted. If the estimated receipts are insufficient to cover expenditures the deficit must be covered by raising the railway tariffs. Should the increases be deemed undesirable, the Minister of Public Works must take action within a month to oppose them. In that case, Parliament within two months must vote a credit equivalent to any reduction in rates it may demand. As no action has been taken in the present instance, the new rates become effective January 1.

New Passenger Fares

The passenger fares will be raised from 25 to 31½ centimes a km. third class; from 36 to 43 centimes second; and from 52 to 60 centimes first class. But even at 31½ centimes, the third class fare is still low, being equivalent to little more than a halfpenny a km., or not much more than three farthings a mile. The average increase in the goods tariffs will be 24 per cent.

This is the second time within six months that fares have been revised. On July 20, they were raised from 20 to 25 centimes third class, 30 to 36 centimes second class, and 45 to 52 centimes first class. On July 12, the goods tariff was raised by 17.8 per cent. on the average, though the rise was only 15 per cent. for livestock and farm produce. The goods rates were further revised and simplified on August 12.

Yield of Goods Traffic

Goods traffic provides about 75 per cent. of the railway receipts, and passenger traffic about 25 per cent. Three-fourths of the passenger receipts come from the third class, one-fifth from the second class, and only one-twentieth from the first class. The number of first class passengers is less than 2 per cent. of the total. How the new fares will affect the cost of travel may be seen in the following examples. A third class ticket from Paris to Lille will cost fr. 82 instead of fr. 65, from Paris to Lyons fr. 162 instead of fr. 129 and from Paris to Marseilles fr. 272 instead of fr. 217.

Although the rise in fares and rates is estimated to bring in a considerable gain in revenue, some falling off in traffic in the immediate future may be expected, especially in the week-end and holiday traffic, which has recently been intense throughout France. Increased costs of goods transport will also give further impetus to the upward trend of prices. The problem of the railway deficit will also be rendered difficult—despite the gain in revenue—by the wage and pension increases as well as allowances voted to the railwaymen, including the 80,000 additional men required under the operation of the 40-hr. week.

Railway Deficit

Dealing with the railway deficit, M. Pomaret in his report on the budget to the Finance Committee of the Chamber, said that a supplementary expenditure of fr. 610,000,000 due to cost of living indemnities would be required, and that this might rise to fr. 1,000 million if railwaymen had the same advantages as civil servants.

The railways must also face higher costs of upkeep and fuel due to rising prices. Although receipts were increasing, he estimated an operating deficit of fr. 3,500 million which would grow to fr. 4,000 millions when renewal funds and debt charges were added. To the operating deficit must be added capital charges of more than fr. 4,000 million and 2,200 million representing debt charges, for which the State was responsible. In all, the railway deficit in 1938 would involve a total burden on the national budget of about fr. 10,000 million. Of this total, an amount of 4,000 millions would be covered by the increase in railway tariffs.

Possible Inclusion of Algerian Railways in National Concern

The question of including the Algerian railways in the National Railways Company is now being studied by the services of the co-ordination of North African affairs and those of the Ministry of Public Works.

Higher Metro Fares

Paris Metro fares, which were increased on August 4, will again be increased on January 1. Second class fares will be raised to fr. 1 10 centimes, and first class to fr. 1 60 centimes. The Paris-Orleans Company, which has carried out the electrification of the line from the Luxembourg station to Robinson, and Massy-Palaiseau in the suburbs on behalf of the Paris Metro, has now withdrawn the last steam locomotive. The line is now operated with the new electric rolling stock. Transfer of the line to the Paris Metro will probably take place on January 1, as this is the date fixed for the introduction of the increased railway fares throughout France.

EGYPT

Tickets to Sudan now Include Dining, Sleeping, and Steamer charges

In connection with the issue of through tickets between the E.S.R. and the Sudan Railways, referred to in THE RAILWAY GAZETTE of April 9 last, the combined first class tickets have included dining and sleeping car charges and Nile steamer fares since November 1. The charges for these combined tickets are : Alexandria or Port-Said to Port Sudan, or *vice versa*, E.19·500 mm.; Alexandria or Port-Said to Port Sudan (*via* Khartoum), or *vice versa*, E.23·500 mm. ; Alexandria or Port-Said to Juba, or *vice versa*, E.40·500 mm. ; Alexandria or Port-Said to Nimuli, or *vice versa*, E.45·500 mm. The E.S.R. coupon is valid for ten days, including the date of issue and the journey can be broken at Cairo, Luxor, or both.

THE JAMAICA GOVERNMENT RAILWAY

Enquiry and report of Mr. E. M. Bland, former General Manager, Nigerian Railway, concerning the working of the line, and his recommendations for greater efficiency and economy to enable competition to be countered and earnings increased

EARLY in the present year it was decided to obtain an independent opinion on the working of the Jamaica Government Railway, and Mr. E. M. Bland, C.M.G., the late General Manager of the Nigerian Railway, was asked to inspect the railway and report on it. The terms of reference according to the Colonial Secretary's Memorandum of April 14, 1937, were as follow:—

1.—To investigate and report to Government upon the working of the Jamaica Government Railway with special reference to the present condition and future requirements of its workshops, rolling stock and permanent way.

2.—To advise as to any steps which might be taken to secure more efficient and economical working of the railway, and to enable it to meet competition, whereby its earnings may be increased.

Jamaica, the largest island of the British West Indies, has 210 miles of railway open to traffic, all of standard gauge. The report says that the type of country traversed by the railway is extremely difficult. Rivers and streams have had to be crossed with wide openings to carry off flood waters, due to the hilly nature of the country. Landslides are frequent and the line is often blocked. A downpour of rain of 21 in. in 4 hr. is mentioned. In 1933 damage by floods involved repairs costing £59,000. Nevertheless, to obviate these difficulties by rebuilding the railway at enormous expense is at present financially quite impracticable, and all that can be done is to make gradual improvements for which a Betterments Fund should be constituted. Meanwhile the exceptional characteristics of the railway will always make the working expenditure high; the wear and tear on engines and rolling stock is heavy, and the grades and curves strictly limit the paying load, militating against economical working.

Engineering Department

On the expenditure side the report deals separately with the different departments. In the Engineering Department the expenditure in the estimates for 1937-38 stands at £74,307, or £352 a mile of main line, and 29·03 per cent. of the whole expenditure. In the superintending staff, an assistant engineer and some draughtsmen, foremen, &c., might be dispensed with, but it is not advisable to reduce the figure of 1·9 men a mile of main line in the permanent way gangs, in view of the steep grades and sharp curves. It will be necessary to spend large sums on ballast, and the estimate for this is £1,200, or say 12,000 cu. yd. A saving can be effected if instead of carrying the ballast out level with the top of the sleeper it is sloped from the centre to the bottom of the end of the sleeper. The sleepers obtained locally at 10s. each are of good quality. Sleepers should be adzed at an inclination of 1 in 20, to fit the coning of the wheels; at present this is not done. A number of level crossings might be abolished. As regards rails some of the track is laid on the actual coast where it is subject to corrosion from salt spray, and the life of the rails is not more than five years. Considerable relaying is advisable, but it is not considered necessary that all the line should be laid with rails of 80 lb. section; the B.S.S. flat-bottom rail of 65 lb. ought to be sufficiently heavy on certain lines, and in 33 ft. lengths. The relaying recommended, to be spread over five years, amounts to 10½ miles of 80 lb. and 26 miles of 65 lb., the cost of which is estimated, with labour, at £71,850. It is recommended that the pier at San Antonio be abandoned. The maintenance of telegraph and telephone lines should be handed over to the Posts & Telegraphs Department at an agreed charge. In all, the economies recommended in the Engineering Department will amount to £9,022.

Locomotive Department

The cost of the Locomotive Department appears in the estimates as £102,709, or 40·17 per cent. of the total. Various retrenchments are recommended in the staff. The reports says:—

"Owing to the extremely unbalanced nature of the traffic an excessive number of train crews are maintained. Without an alteration in the present shipping arrangements of the banana traffic the only way to reduce expenditure is to increase the train load by procuring an engine of greater capacity. The adoption of Garratt locomotives would reduce the number of engines and crews required. . . . There should be no difficulty in getting a Garratt locomotive with an axle load not exceeding the present maximum of 13½ tons and a tractive effort of 50-55,000 lb."

It is recommended that five obsolete engines be replaced with three modern locomotives, at an estimated outlay of £40,000. Three diesel shunting engines should also be procured. As regards locomotive repairs, the present figure of £1,108 average cost of a general repair, is high, and average mileage between general repairs is too great, especially for the locomotives of American design. Improvements are recommended by cutting down labour costs, speeding up production and adopting a modified costing system. A number of economies is detailed in staff, the effect of which would be a saving in the departmental expenses of £14,276.

Traffic and Accounts Departments

In the Traffic Department the cost of working for 1937-38 appears in the estimates as £60,164, or 23½ per cent. of the total expenditure. Recommendations are made in detail for a reorganisation of the station and train staff, and for the suppression of redundant paper forms and records. By suitably merging duties many men can be dispensed with and the saving would amount to £5,068. Similarly in the Accounting Branch a simplification of documentary work is recommended, especially in centralising work under the Accountant and abolishing departmental overlapping and duplication, the economy being estimated at £1,903. The post of Traffic Superintendent might well be abolished and the duties assumed by the Director of Railway, who might also, if an engineer, take over the Engineering Department. The title of the Director of Railway should be substituted by the more usual one of General Manager.

The report is emphatic on the necessity for a properly constituted reserve fund. Although funds have been provided at various times for the purpose, the matter has never been placed on a proper basis. A table is given of the present-day values of the wasting assets, and the percentage which should be allowed for each to provide for its renewal. The sum required, £61,229 should form part

of the annual provision necessary for the upkeep of the railway. "The railway is essential to the trade of the country . . . and the Colony will have to recognise that the sums necessary must be provided annually. . . . It will take some years to build up such a fund; in the meantime the Colony must be prepared to put by this sum every year."

The capital of the railway is £3,956,627 on which interest and sinking fund charges in 1937-38 amount to £89,335, the latter being £32,744. If the £61,229 is voted for the renewals there is no need to provide £32,744 for redemption. The economies which have been indicated will amount to £31,219 and the future budget of the railway would be:—

	£
Working expenditure	221,903
Renewals	61,229
Total	283,132
Interest	56,591
	339,723

With an assumed revenue of £311,000 for 1938-39, the railway will be unable to meet the full interest charges. If the proposed legislation now before the Council in connection with motor transport is adopted, it will go a considerable way towards helping the railway. The railway cannot afford to reduce its charges any further, and the solution is to ensure that the motors bear a fairer proportion of the cost of upkeep of the roads. Annual road expenditure, with interest and sinking fund, is £261,403, while revenue from import duties on vehicles and petrol plus licences, &c., is only £198,013, a difference of £63,390 by which Government in reality is subsidising motor traffic to the detriment of the railway. It is impossible for the railway to go on fighting a rate-war against the motors while these enjoy such unfair advantages. The principal traffic is bananas (212,499 tons were carried in 1936-37) and the tariff on these has already been reduced as far as it can be. As regards passenger traffic there is too much free and reduced fare travel, and the far too numerous concessions should be revised. There does not appear to be at present any call to introduce railcar services, either diesel or otherwise.

Finally the report suggests that greater use should be made of the Railway Advisory Board, composed of leading citizens acting in a purely honorary capacity, and of which the General Manager should be Chairman. "The salvation of the railway may be stated in a few words: Reduce expenditure; tax motors so that they bear the full cost of maintaining the roads; and enforce the road transport laws regarding the carriage of goods and passengers. If this were done the railway (with the reductions I have recommended) should soon recover its losses and be placed on an economic basis, and I feel sure that it would shortly be in a position to reduce its charges."

The New All-Welded Steel Factory of Murex Welding Processes Limited

ON Monday, December 13, we were given an opportunity of inspecting the new factory for the manufacture of welding electrodes now under construction for Murex Welding Processes Limited at Waltham Cross. The factory, which at present covers an area of 4½ acres, in a rectangular block 500 ft. by 373 ft., is to be one of the largest all-welded steel-frame structures of its type in the country, and is expected to be completed and in production in April, 1938.

All the welding was carried out in the shops and on site by the electric arc process, using Murex welding plant and Ironex electrodes, and some idea of the speed of working may be obtained from the fact that the light secondary girders (of which there are 48 in the structure) were turned out at the rate of three a week by a gang of three welders and four erectors from cut lengths delivered on site.

As regards the main features of the structure, the primary consideration was the provision of the maximum possible unobstructed floor space, and after the consideration of a number of schemes a design with only four internal columns was finally adopted as being the most practical and economical. The purlins, which are 3 in. × 2½ in. × ¼ in. angles, are carried on joist rafters spaced at 12 ft. 6 in. centres, the ends of which are carried on 125 ft. span lattice girders, spaced at 31 ft. 3 in. centres and weighing approximately 4½ tons each.

Running the entire length of the structure, and carrying the ends of the lattice girders, are three main girders, 500 ft. long and weighing approximately 70 tons. These are designed to be continuous over two intermediate supports, and in order to provide for the large positive bending moments the effective depth of each girder is increased at these intermediate supports.

The total weight of steelwork in the structure is approximately 850 tons, giving a weight of 10 lb. of steel per sq. ft. of floor space.

Considered as a whole, the structure represents a notable advance in a method of construction which is rapidly making headway where strength, lightness, rigidity, speed of erection, and economy of materials are the main desiderata.

The new factory was designed by Mr. E. S. Needham, A.M.Inst.C.E., and below are the names of the main and sub-contractors:—

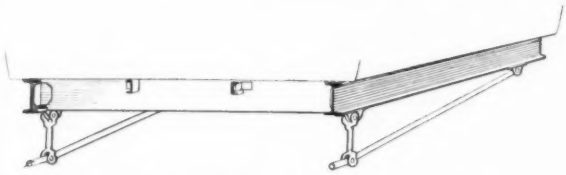
Main Contractors for Steel: The Colville Constructional Co. Ltd.
Sub-contractors: Head, Wrightson & Co. Ltd. (main girders); J. Booth & Co. Ltd., Bolton (secondary girders).
Guttering: G. A. Harvey & Co. Ltd.
Glazing: Henry Hope & Co. Ltd.; Williams & Williams.
Roof-sheeting: Turner's Asbestos Cement Company.
Roof Lining: Celotex Limited.
Painting: G. Millar & Company.

TRANSPORT IN BRITISH EAST AFRICA.—The improved financial position of the Kenya and Uganda Railways is referred to in a report published by the Department of Overseas Trade covering the period April, 1936-June, 1937, price 1s. 6d. net. In both the years 1935 and 1936 the estimated surplus in receipts was far exceeded, enabling certain rate reductions to be made, estimated to afford to the public of the territories served by the railway system relief to the extent of £239,000 annually. The results of working of the Kenya and Uganda Railways were reported in THE RAILWAY GAZETTE of July 2, 1937. Of the Tanganyika Railways the report also gives a favourable account, the improved position—whereby an estimated deficit of £54,655 was turned into an actual surplus of £52,875—being mainly accounted for by a general improvement in economic conditions. The results of working of the Tanganyika Railways were described in THE RAILWAY GAZETTE of September 10, 1937.

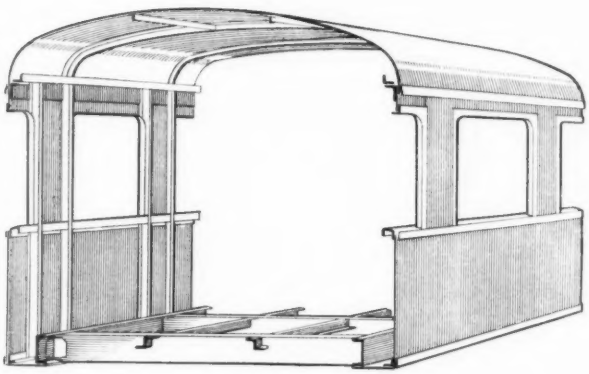
NEW LIGHTWEIGHT SUBURBAN COACHES FOR THE EASTERN RAILWAYS OF FRANCE

These coaches are of special tubular construction in which high-tensile steel has been used and welding extensively adopted

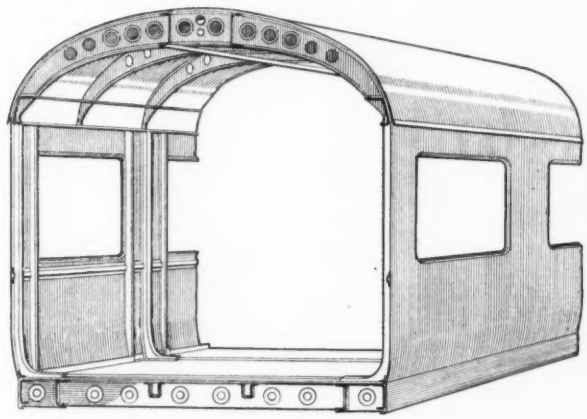
SOME new passenger coaches of extra light construction are now being built for the Eastern Railways of France, to replace old wooden ones which are being scrapped. Interest in the design of the new vehicles is mainly metallurgical, the problem that arose being to obtain an all-metal coach of approximately the same weight-to-carrying-capacity ratio as the wooden ones, so that the existing locomotives might be retained in service. The accompanying illustrations show the methods by which this object is being attained. The main reduction in weight is obtained by a simplified tubular construction of the body and underframe. The body framing is built up of a special steel possessing greater strength than the steel hitherto used. The steel has a breaking resistance of 58-65 kg. per sq. mm. and an elastic limit of 40-50 kg. together with an elongation of 18 per cent. and impact strength of at least 6 kg. With this steel it was possible to obtain a coach 12 tons lighter than the ordinary steel vehicle of similar proportions, at an additional cost of only fr. 9,000 or 2·7 per cent. of the total cost.



Underframe for wooden body construction. Resistance to tension and compression localised in the steel underframe

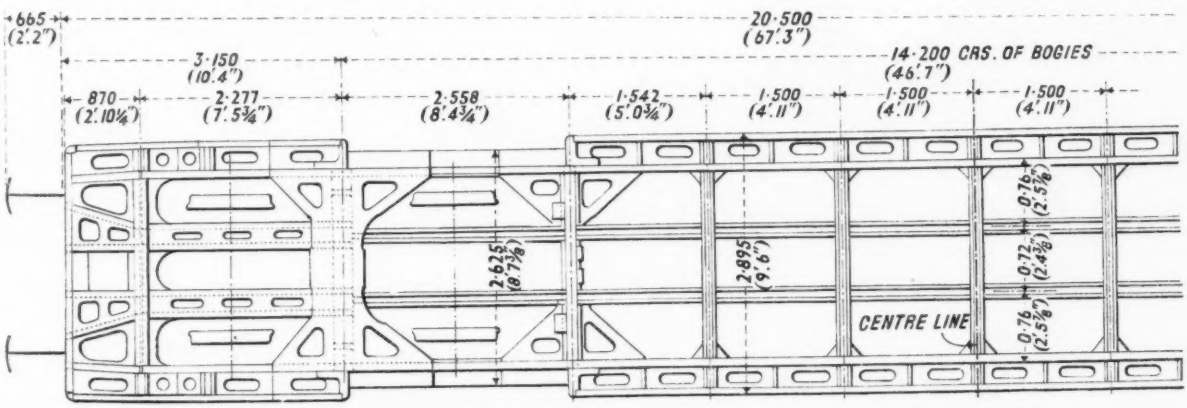


Semi-tubular metal construction. Resistance to tension and compression localised almost entirely in the underframe and side frames

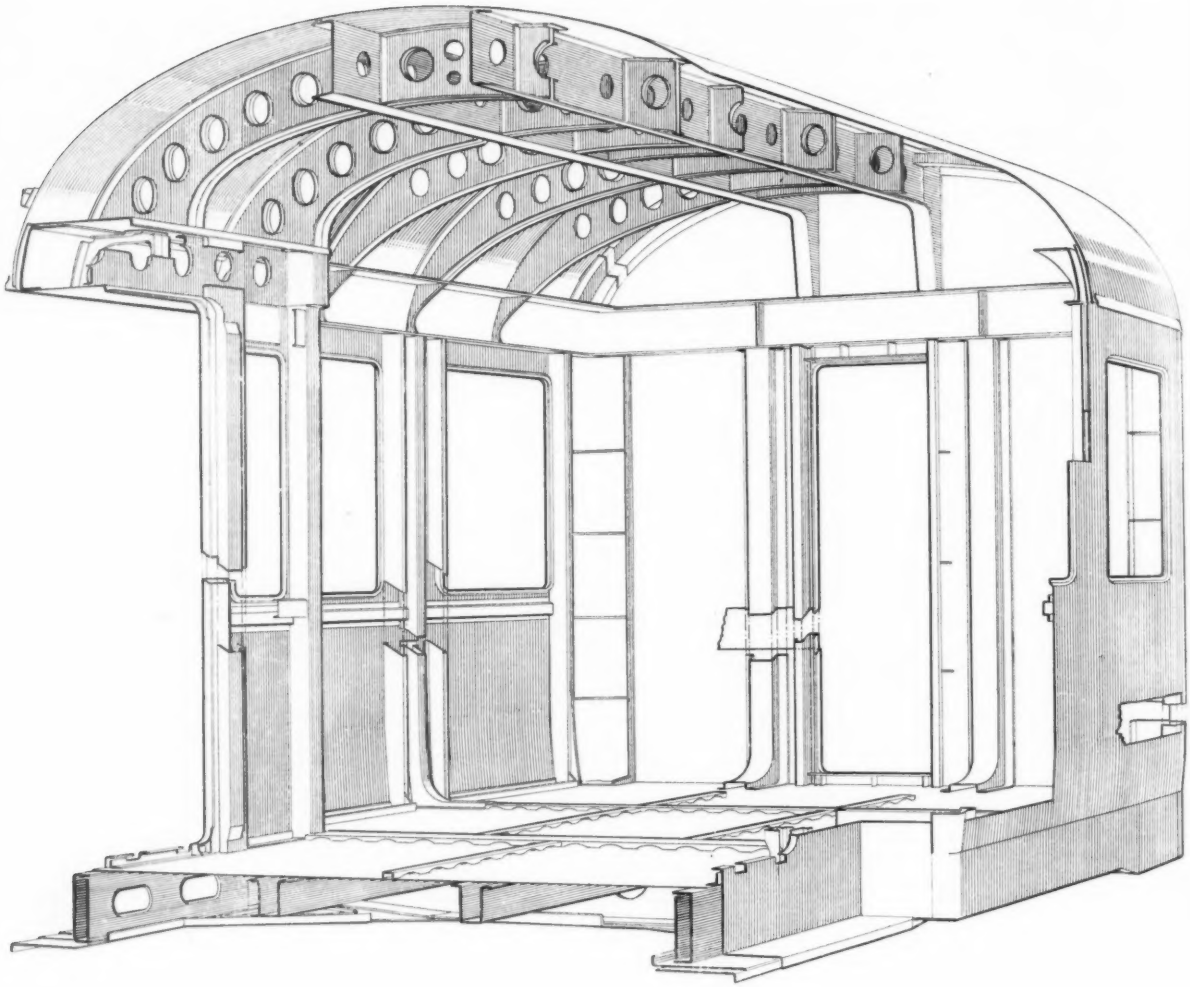


Tubular metal construction. Resistance to tension and compression taken by the underframe, sides, and roof, in the form of a tubular girder

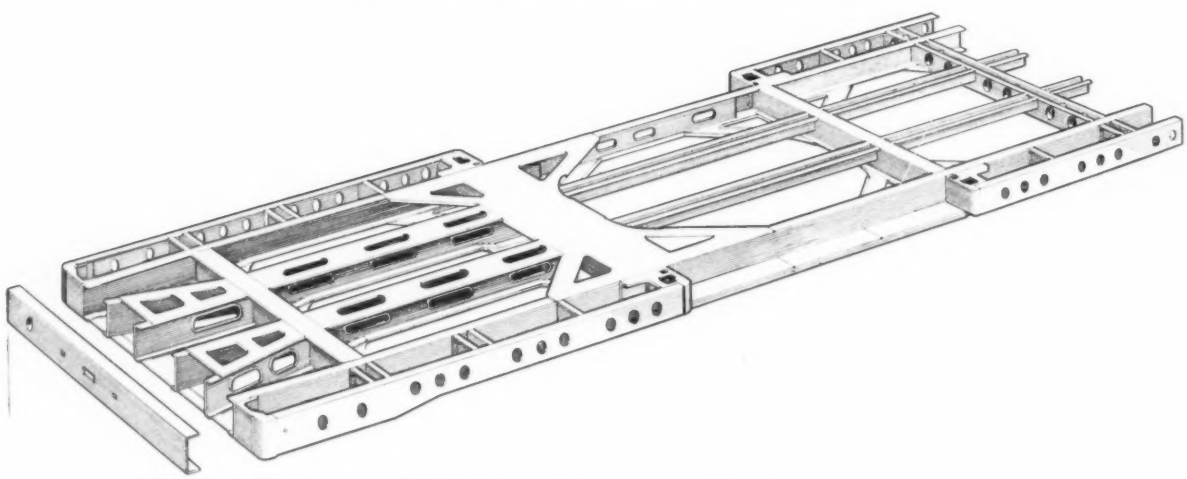
The body framing is built up with pressed steel members, welded together by electric arc or flame welding. Each pressing is cut away as far as possible to remove unnecessary weight, and all solid rolled sections or steel



New lightweight steel coaches for the Eastern Railways of France. Plan of underframe

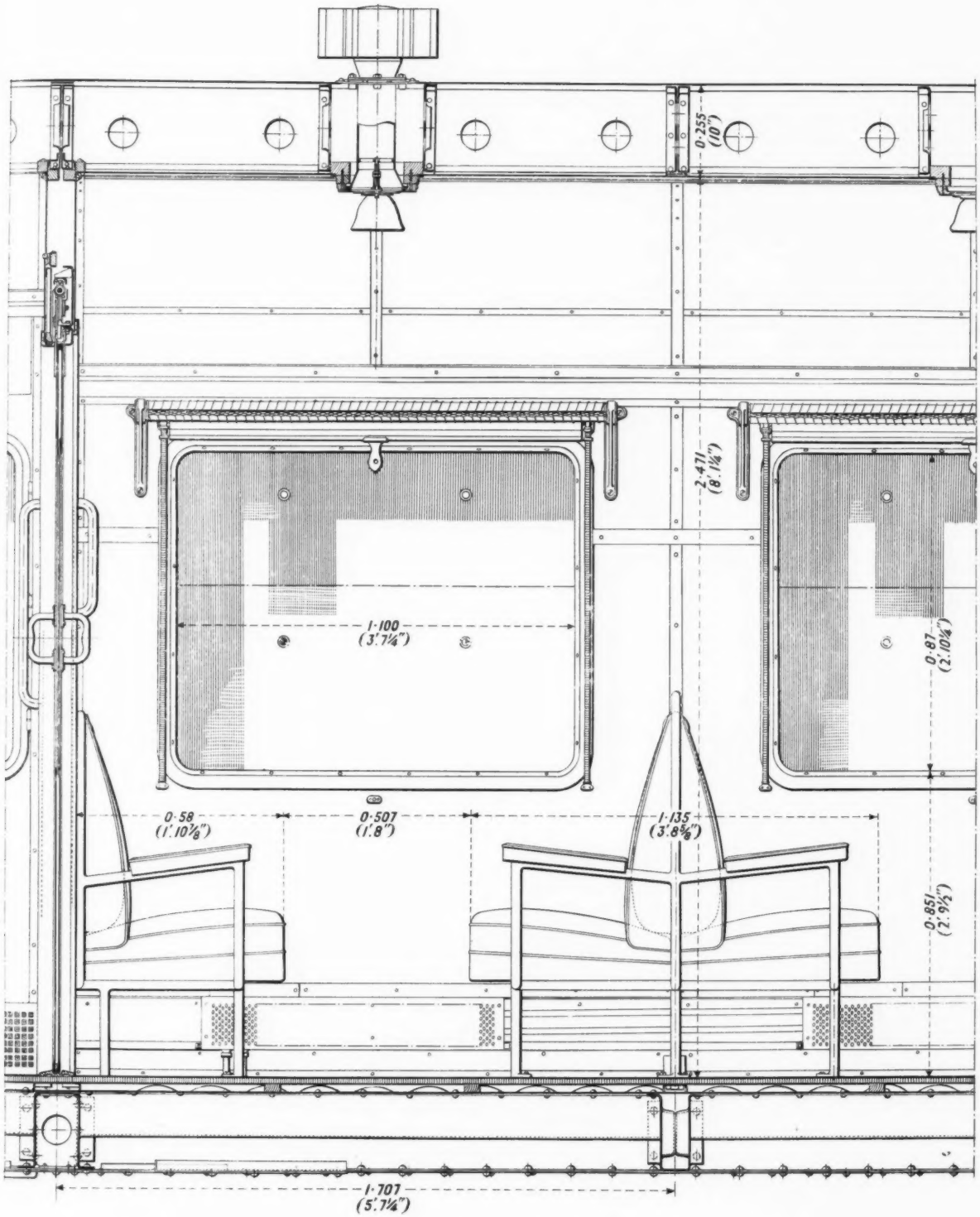


Isometric view showing the tubular girder construction



Isometric view of one end of the underframe

NEW LIGHTWEIGHT STEEL COACHES FOR THE EASTERN RAILWAYS OF FRANCE



Part interior elevation and section

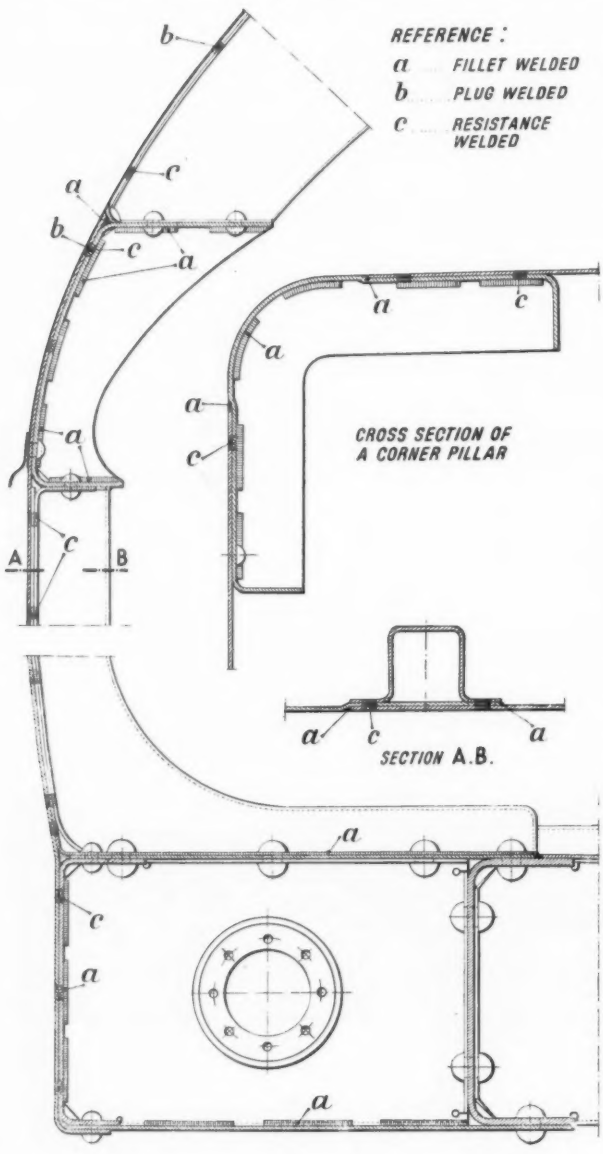
NEW LIGHTWEIGHT STEEL COACHES FOR THE EASTERN RAILWAYS OF FRANCE

castings have been eliminated from the construction. The design of the frame is such that compression stresses are taken up by bending or tension. The panel plates of the body could thus be reduced in thickness to act only as ties bearing almost no stress. In places where strain might be feared an internal light stiffener has been welded on to the panel plates.

Important reductions in weight have been secured in the bogies, the frames of which are of the monobloc type, with the parts lightened as far as possible. The axles are hollow bored, realising a saving of 275 kg., and a further gain of 96 kg. is obtained by making the walls of the journal boxes thinner, while by lightening the wheel centres and using corrugated cast steel in their manufacture an additional 320 kg. has been saved in each vehicle. The suspension equalisers have been cast in a single piece of steel instead of being made in sections as is generally done, and this, together with the use of cast steel bolster beams, has permitted a saving of 405 kg. The total weight of the new bogie is 5,340 kg., which compares most favourably with the 6,340 kg. of the ordinary bogie. The construction is such, however, that they are perfectly able to take the weight of the standard main-line coaches weighing from 47 to 49 tons.

In the interior of the coaches copper-aluminium alloy has been used for all the forged or cast parts which have to be painted, and Duralinox, a magnesium aluminium alloy, for the castings and forgings which have to be polished. Internal facings have been made in Almasilium, 0·05 in. thick. The ease with which aluminium alloys take paint has led to the use of such material for the window frames, mouldings, and parts formerly made in wood or steel; the only exception is that small wood pieces have been retained to allow fixing the upholstery of the sides by wood screws, avoiding the inconvenience of numerous small nuts and bolts.

The trains are made up of coaches in three styles, *viz.*: composite first and second class; all-third; and composite vehicles with first, second and third class accommodation. The total seating capacity of individual vehicles in the foregoing order is 180, 203, and 176. The photograph reproduced actually shows a standard Eastern Railways of France steel suburban coach weighing 43 tons; the new lightweight steel coaches will be of exactly similar external appearance but weigh only 31 tons.



Sketch showing types of welds used at different points for the assembly of the frame

---

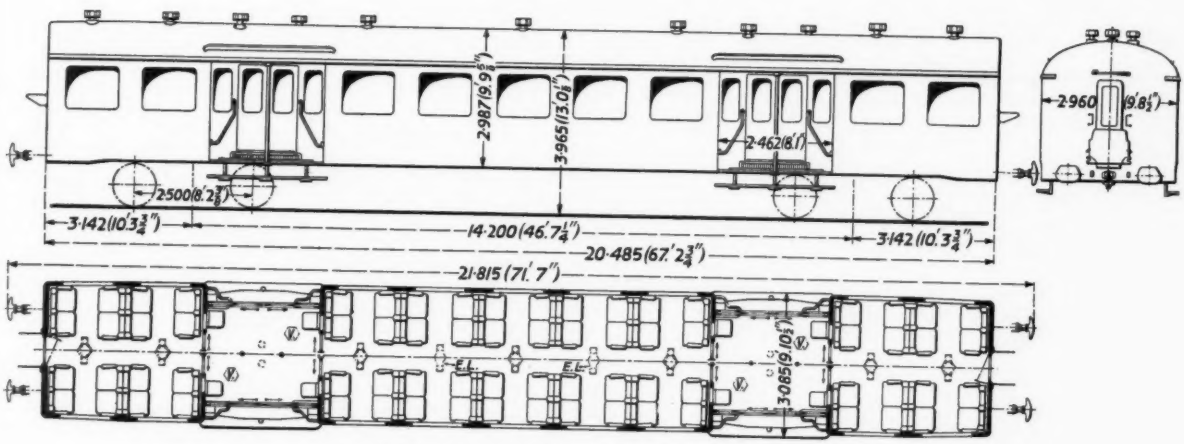
RAILWAYS IN BRITISH WEST AFRICA.—A report on economic and commercial conditions in the British dependencies in West Africa, published by the Department of Overseas Trade, and covering the period November, 1936, to March, 1937 (price 1s. 3d. net), gives particulars in a section headed "Communications and Transport" of the three Government railways operating in the Colonies of Sierra Leone, Gold Coast, and Nigeria.* There is no railway in the remaining British West African colony, Gambia. Referring to the Sierra Leone Railway, the report says the increased receipts are an indication of the improved business conditions in the Colony. Reference is also made to the new railway of the Sierra Leone Development Company, for the transport of the iron ore from the mines at Pepel, on the Rokel River. The results of working of the Sierra Leone Government Railway were reported in our issue of September 24.

Referring to the Gold Coast Government Railway, the report says that for the first time since the year 1929-30 a surplus was earned, due to a combination of factors but mainly attributable to improved trade conditions. The results of working of the Gold Coast Railway were fully described in THE RAILWAY GAZETTE on October 15.

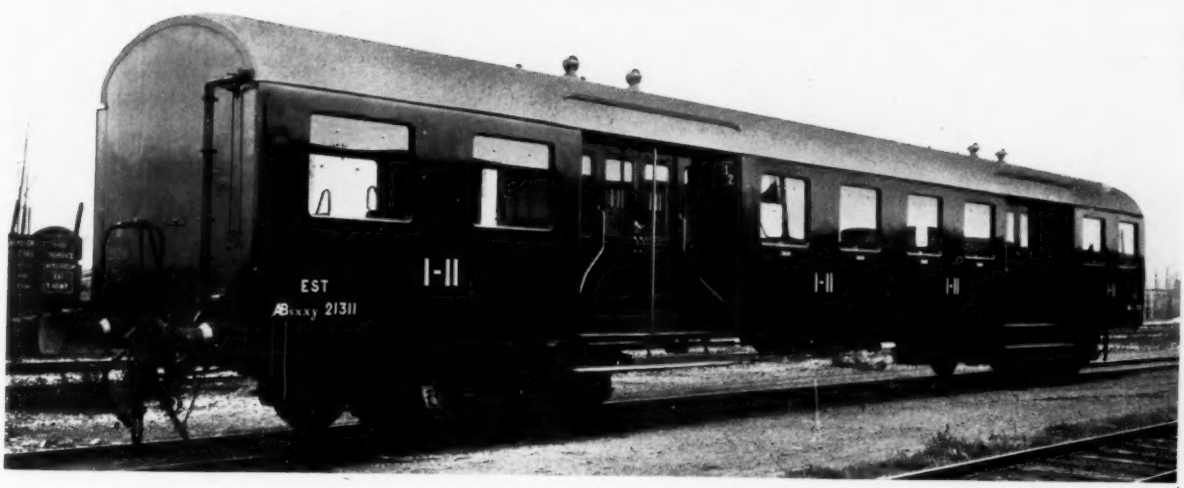
In dealing with the Nigerian Railway, which now has a total route mileage of 1,900 miles, the report says that as from April 1, 1936, the railway became fully commercialised under Government financial control. The railway will in future be required to meet its working expenditure and the balance of its interest charges, and also to make a full annual contribution to its renewals fund. Road motor lorry feeder services are operated in the north from Zaria as a centre, where road vehicle repair shops are located. These road feeder services, operated by the railway administration, ran a total of 332,409 miles and carried 5,532 passengers and 19,308 tons during the year ended March 31, 1936. There are approximately 21,000 miles of motorable roads in the territory, of which some 8,000 miles are all-weather roads. The working results of the Nigerian Railway were set out in THE RAILWAY GAZETTE of January 1, 1937.

* These were described in our special Overseas Number of November 24.

One of the all-steel suburban trains in service near Esbly



First and second class lightweight metal coach

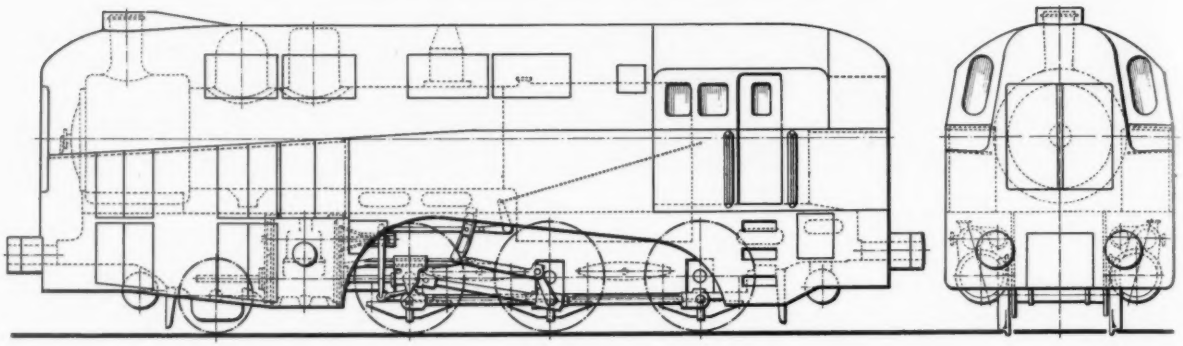


Ordinary all-steel suburban coach, to which the new lightweight coaches are similar in appearance

NEW LIGHTWEIGHT STEEL COACHES FOR THE EASTERN RAILWAYS OF FRANCE

STREAMLINED TANK LOCOMOTIVES FOR DOUBLE-DECK SUBURBAN TRAINS, LÜBECK-BÜCHEN RAILWAY

Streamlined casings and remote control fittings have been applied to some existing 2-6-0 type tank engines



IN THE RAILWAY GAZETTE for January 31, 1936 (pages 212-213) and for May 22 of the same year (pages 1002-1004) we included articles illustrating and describing the streamlined double-deck trains which had then recently been placed in service on the Lübeck-Büchen Railway. Trains booked to cover the 39 miles between Hamburg and Lübeck in 40 min. start-to-stop and other services averaging about 30 m.p.h. overall, with 10 intermediate stops, are hauled by specially designed streamlined 2-4-2 type tank locomotives, built by Henschel & Sohn, A.G., Kassel; the coaching stock was built by the Linke-Hoffman Werke, A.G., Breslau, and the Wurnag Waggon und Maschinenbau, A.G., Görlitz. More recently, and for the 1937 service, some existing 2-6-0 type superheated tank engines were taken into the shops at Lübeck, where they were fitted with streamlined casings in order to conform with the general contour of the double-deck coach units. Five of the engines were thus treated, and they were at the same time fitted with electrically operated remote-control gear for use when running with the engine pushing. Scharfenberg centre couplings are used at the cab end of the locomotives, with built-in cable connector and connections for air and heating pipes. Uerdinger ring springs are fitted in the rear buffers, the heads of which project about 20 mm. ($\frac{3}{4}$ in.) beyond the buffer surface of the Scharfenberg coupling. The buffers are thus subjected to some initial compression when the train is coupled, and the increased buffer friction damps lateral movement between the locomotive and coaches when working with the locomotive pushing.

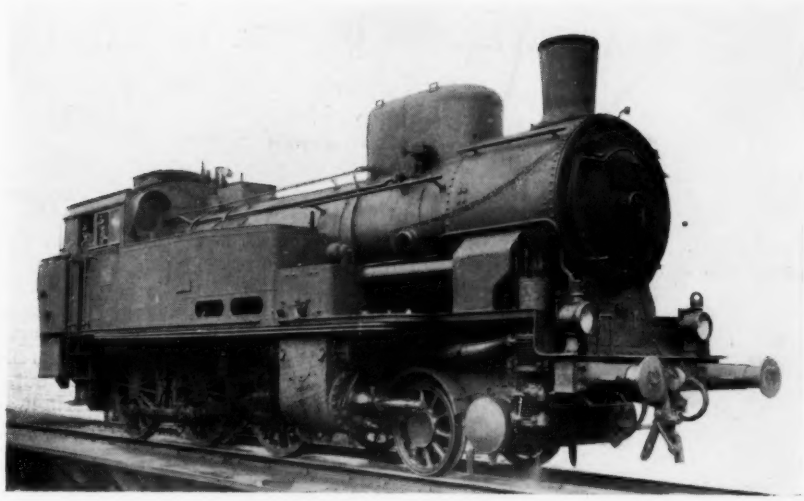
No change was made in the construction of the locomotives themselves, but as the shape of the bunkers had to be altered, new bunkers and cabs were fitted at the same time, thus effecting considerable improvement of form, besides increasing the coal capacity from 2 to $2\frac{1}{2}$ metric tons (1 ton 19 cwt. to 2 tons 9 cwt.). The casing round the boiler does not rest on the boiler, but is mounted, by means of welded hoops, on an angle iron framework attached to the main frames independently of the boiler. The longitudinal expansion of the boiler therefore does not affect the sheet casing.

The casing consists of 2-mm. (0·079-in.) sheet screwed to a welded framework of rolled sections (flats and angle irons) which is itself screwed to the locomotive frames. Hinged doors of ample size are provided wherever access to motion work or other parts is required, and the doors at the front of the casing are large enough to permit the smokebox door to be fully opened. The general design and construction are such that the casing and cab can be easily detached for examination of the boiler. Moreover, the casing is of such substantial construction that it is not liable to damage during removal and replacement.

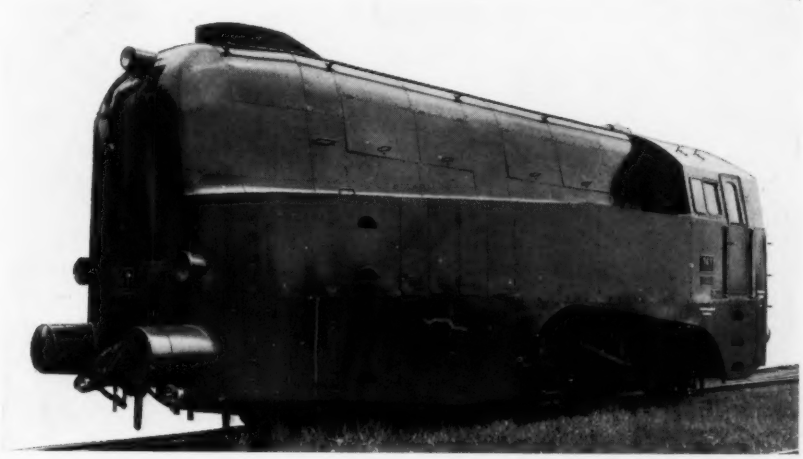
Alfol insulation is used for the boiler and cylinders. The gas-lighting of the locomotives is retained as a stand-by, but supplementary electric lighting is installed, supply being taken from the lighting generators of the double-deck coaches through the automatic cable-coupling. A detachable ventilator is fitted on the roof of the driver's cab; this has an electrically-driven fan which removes warm air even when the locomotive is standing. The remote control arrangements are similar to those on the fast 2-4-2 locomotives already referred to. Telephone communication is provided between the footplate and the driver's cab. The following are the leading particulars

Cylinders, dia.	540 mm. (21¼ in.).	
Piston stroke	630 mm. (24¾ in.).	
Wheels, coupled, dia.	1,500 mm. (4 ft. 11 in.).	
Wheelbase, rigid	3,900 mm. (12 ft. 9½ in.).	
,, total engine	6,500 mm. (21 ft. 3⅞ in.).	
Boiler, heating surface :—		
Tubes and flues	101·40 sq. m.	(1,091·1 sq. ft.).
Firebox	11·60 ,,	(124·8 ,,).
Total (evaporative)	113·00 ,,	(1,215·9 ,,).
Superheater	34·70 ,,	(373·4 ,,).
Combined heating surfaces	147·70 ,,	(1,589·3 ,,).
Grate area	2·18 ,,	(23·45 ,,).
Boiler pressure	12 kg. (170 lb. per sq. in.).	
Weight in working order	69·6 *tonnes* (68 tons 10 cwt.).	
Water capacity	6 cub. m. (1,320 gal.).	
Fuel capacity	2·5 *tonnes* (2 tons 9 cwt.).	
Maximum tractive effort	8,816 kg. (19,435 lb.).	

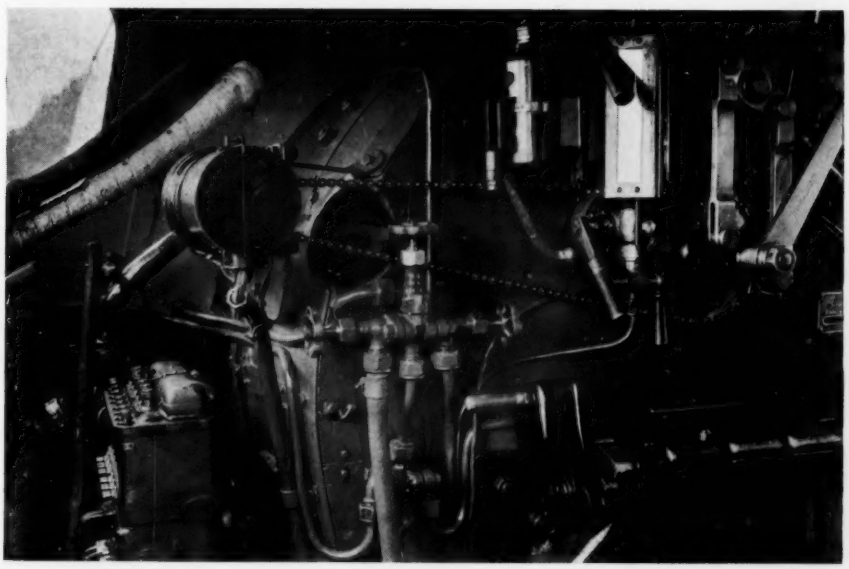
As in the double-deck coaches, the lamps are below the buffers. Specially designed casings accommodate two lamps side by side so that the various indications can be switched on from the cab. The information here given is derived from an article by Herr Baurat dipl.-ing. P. Mauck, mechanical engineer, Lübeck, which appeared in one of the recent issues of the official German railway publication, *Die Reichsbahn*, and we are indebted to Herr Baurat Mauck for the loan of the photographs and the drawing we reproduce.



Right: One of the five 2-6-0 type locomotives before being streamlined



Left: One of these engines as now streamlined



Right: View of the cab showing, inter alia, the remote control gear for working the regulator from the far end of the train

STREAMLINED TANK LOCOMOTIVES FOR DOUBLE-DECK TRAINS, LÜBECK-BÜCHEN RAILWAY

STATION DESIGN ON THE EGYPTIAN STATE RAILWAYS

A brief description of some of the more modern types and history of the older structures

OF recent years there has been a systematic programme of station building reconstruction in Egypt. For wayside stations, standard designs are usually worked to. The smallest of these (Type E) consists of only two rooms and a hall. One of the rooms is used by the stationmaster and the other as a ladies' waiting room. A larger design (Type D) consists of an entrance hall, stationmaster's office, luggage office, ladies' waiting room, store and lavatories.

The largest of the designs (Type C) consists of an entrance hall, a stationmaster's office, a separate booking office, a telegraph and telephone office, a luggage office, a gentlemen's waiting room, a ladies' waiting room, a store, a post office, and a public lavatory. The approximate cost of construction of the three types is: Type E, £E.482; Type D, £E.1,342; and Type C, £E.2,350. At places where larger buildings are deemed necessary, special designs are prepared.

Two features call for special consideration in the design of station buildings in Egypt. The first of these is that at large stations third class passengers must be provided with a separate booking window and a separate entrance and exit. The second feature is that a separate waiting room must be provided for women. The stationmaster's office is arranged to have direct access to the booking, telegraph and telephone office, and luggage office. The telegraph and telephone office serves both the passengers and the general public.

It is a pleasing feature of station design in Egypt that the Chief Architect, Mohamed Eff. Raafat, has selected the Pharonic and Moorish (or Arabic) styles of architecture for most of his edifices. The following is a brief description of some representative station buildings.

Stations in Cairo and Alexandria

The first station in Cairo was built about 1856; the existing building, which is in Arabic style, was built in 1892. Internal alterations and three extensions have since been carried out, the last being the extension in 1932 to house the Railway Museum. The area occupied by the present station is 5,130 sq. m. There are six passenger platforms for Lower Egypt, four of which are covered by a 44 m. span roof, and three platforms for Upper Egypt, with separate shelters. A royal entrance and waiting room, richly decorated in Arabic style, form the central feature of the front elevation. The first and second floors accommodate the general management, traffic, goods, and audit offices. Cairo station building is the largest on the system.

Alexandria station, designed and begun before the war, but not opened until 1927

In the same square as the main station in Cairo, and harmonising with it in style, is the Pont-Limoun station, which serves the suburbs north of Cairo, and was constructed in 1914. The Suez diesel railcars arrive at and depart from this station. The ground floor houses the usual offices, while the upper floor contains the offices of the railway police.

The original station in Alexandria was erected early in 1856 with the opening of the Cairo-Alexandria line.

Right: The 110-m. façade of Tanta station in the Arabic style, opened in 1933. The five platforms are on a level with the first floor and are reached by subways and stairs

Left: Kom-Ombo station, completed in 1933. As there is much tourist traffic there, it is designed in the ancient Egyptian style

Below: Guiza station, also in the same style, but much larger and containing a royal waiting room. Opened in 1935

THREE TYPICAL MODERN TYPES OF EGYPTIAN STATE RAILWAYS STATION

Fifty years later this was found insufficient to cope with the constantly increasing traffic, and the construction of a new and larger station was decided upon.

Work on the new station was put in hand in 1913, but had to be suspended in 1914 owing to the outbreak of war. It was subsequently resumed and on November 1, 1927, was officially opened to traffic. The front elevation measures 90·1 m. and the north elevation 135·1 m. The area covered is about 4,000 sq. m. The station has four passenger platforms covered by a single span of 48 m., identical with that of Cairo station.

Other Characteristic Designs

Tanta new station building was begun in 1930 and completed in 1933. Advantage was taken in this project of the 4-metre difference in levels between the station yard and the passenger platforms to build two passenger subways which pass under the lines and give direct access to the five platforms by means of stairs. An additional central subway for the transport of luggage and mails has been made, and provided with five electric lifts giving direct access to the different platforms.

The front elevation of the station building, which is designed in Arabic style, measures 110 m. The station covers an area of 1,065 sq. m. The ground and platform level floors are entirely devoted to the staff. The second floor accommodates the Divisional Traffic Offices, and the third floor is occupied by the new automatic telephone exchange.

At Mallawi the present station was built in 1929, and derives a very European appearance from its steel awning surrounding the platform buildings, the object of which, however, is to provide shelter from the sun rather than rain. The central vaulted hall is flanked by two wings. In striking contrast is the new station at Kom-Ombo, completed in 1933, which was purposely planned in the ancient Egyptian style on account of the tourist traffic handled there. The massing gives the impression of a small ancient temple, though the internal arrangement of station offices is not adversely affected.

The new station at Guiza, one of the most recent in Egypt, is also executed in ancient Egyptian style. Work was started in 1932, when the foundation stone was laid by H.M. The King, and the new station was opened to traffic in 1935. The central feature, in the form of a portico, gives access to the royal waiting room, which is richly decorated in Arabic style. On both sides of the royal waiting room are two public halls, one for the first and second class passengers, and the other for third class passengers. The offices are accommodated in the two wings of the station, and protection from the sun is given by a colonnade on the east and west sides of the building. A new road and bridge over the canal give direct access to the station.

Preparing for Christmas Festivities at Sea

The Christmas tree, holly, and mistletoe being put aboard the Canadian Pacific steamship "Duchess of Richmond" at Southampton

RAILWAY NEWS SECTION

PERSONAL

Mr. D. M. MacRae, O.B.E., General Manager, Central Argentine Railway, and Mr. J. C. Angel, Local Director, B.A. Great Southern and B.A. Western Railways, returned from Europe on November 16.

Mr. T. B. Stewart, Traffic Superintendent, B.A. Great Southern and B.A. Western Railways, returned to Buenos Aires from leave in Europe on November 4.

Monsieur Lucien Cocagne, General Manager, Compañia General de Ferrocarriles en la Provincia de Buenos Aires, sailed for Europe on leave on November 19. During his absence, Monsieur Paul Paissaud, Deputy General Manager, is acting for him.

INSTITUTION OF CIVIL ENGINEERS

The Council of the Institution of Civil Engineers announces that, having considered a large number of applications for the post of Secretary to the institution, Mr. E. Graham Clark, M.C., B.Sc., Assoc.M.Inst. C.E., has been appointed to this position in succession to the late Dr. H. H. Jeffcott, whose death on June 29 was recorded in our issue of July 2.

Among the associate members elected at a meeting of the institution on December 7 were: Messrs. S. M. Alam (Nizam's State Railway), C. W. Clarke (G.I.P. Railway), A. C. L. Fooks (New Zealand Government Railways), W. Grant (Nigerian Railway), L. S. Johnson (G.I.P. Railway), H. W. C. M. Murray and E. de C. Penso (Jamaica Government Railway), and G. W. D. Venables-Llewelyn (Sir Alexander Gibb & Partners).

The late Mr. Bruce Ismay, a former Chairman of the White Star Line and a Director of the L.M.S.R., whose death on October 17 was recorded in our issue of October 29, left estate in Great Britain valued at £693,306 (£669,719 net).

From *The London Gazette* of December 10: Territorial Army, Royal Engineers, Engineer & Railway Staff Corps: Major James Briggs, M.Inst.C.E., late R.E., to be Major (December 11); Captain R. M. T. Richards, late R.E., to be Major (December 11).

Sir Thomas Alexander Stewart, K.C.I.E., C.S.I., Member of the Indian Governor-General's Executive Council in charge of Communications, was born in 1888, and educated at George Heriot's School, Edinburgh; Edinburgh University; and University College, London. He went to India in 1912, serving at first in the United Provinces as Assistant Magistrate and Collector, and Assistant Commissioner. After military service from July, 1918, he entered the Imperial Customs Service in 1919, holding various posts therein until appointed Officiating Additional Secretary, Department of Commerce, in 1932. In March, 1934, he was confirmed as Secretary to the Department of Commerce, and in 1935 received the order of Commander of the Star of India. Becoming a Member of the Council of State in April, 1936, Sir Thomas was awarded the K.C.I.E. in February, 1937, and assumed charge of the Department of Industries and Labour as a Member of the Governor-General's Executive Council in April of the same year. Last August he was made a Member of the Legislative Assembly; and when, in November, the Department of Communications was formed in the reorganised Executive Council (*see* our issue of August 13), Sir Thomas was appointed its head.

Photo] [Lafayette

Sir Thomas Alexander Stewart, K.C.I.E., C.S.I.

Member of the Indian Governor-General's Executive Council in charge of Communications

At a meeting of the Sheffield Corporation, L.M.S. and L.N.E. Railway Companies' Joint Omnibus Committee, held at Sheffield on December 8, Mr. H. G. N. Read, Road and Air Transport Assistant to the Chief Commercial Manager, L.M.S.R., was appointed Chairman of the Joint Committee for the ensuing twelve months in succession to Alderman A. J. Bailey. Mr. Read, who has served on the joint committee for a number of years, is the present Chairman of the Corporation and L.M.S.R. Joint Omnibus Committee at Huddersfield.

By a coincidence, October 21 saw the completion of 25 years' service by Mr. George A. Gahan with the Commonwealth Government Railways of Australia, of which he is Commissioner—and the 20th anniversary of the running of the first East to West express over that system. After apprenticeship and mechanical experience on the Victorian Government Railways, Mr. Gahan joined the Commonwealth Railways in 1912, and was promoted to be District Mechanical Superintendent three years later. During the war he joined His Majesty's Forces and proceeded overseas on active service. On his return to Australia in 1919, he was appointed Chief Mechanical Engineer of the system, and ten years later was selected for appointment as Commissioner. In spite of the financial depression since then, Mr. Gahan's administration has been eminently successful, and in 1934, on the expiry of his term of office, he was re-appointed for a further period of five years. The extent of the Commonwealth Government Railways is 2,144 route miles, and the system includes the Trans-Australian or Trans-continental line from Port Augusta, in South Australia, to Kalgoorlie, in Western Australia, 1,051 miles in length.

We regret to announce the death, on November 25, of Mr. M. S. Blaiklock, who retired from the position of Assistant Chief Engineer, Canadian National Railways, in 1931. Mr. Blaiklock, who had been Resident Engineer on the construction of the

Christmas at home or Christmas in an hotel have their rival partisans. But both involve travelling for many people, who, as this interior of an L.M.S.R. restaurant car shows, enjoy a foretaste of the authentic festive atmosphere during the journey

St. Clair tunnel (1893), Superintendent (1902-07), and Engineer of Maintenance and Way (1907-22) until he became Assistant Chief Engineer in the latter year, was 77 years of age.

We regret to record the death, on November 17, of Mr. Frank L. Hutchinson, former General Manager of Hotels, Canadian Pacific Railway, at the age of 58.

We record with regret the death at Hessle, near Hull, on December 5, of Mr. Walter McDougal Malt, who retired in 1932 from the position of District Engineer, Hull, L.N.E.R. Mr. Malt began his railway career with the former Lancashire & Yorkshire Railway, and then joined the North Eastern Railway, serving at Darlington, York, and finally at Hull.

It is with regret that we record the recent death of Mr. James McCrea, M.Inst.T., the first General Manager of the Northern Ireland Road Transport Board (formed in August, 1935), who retired from that position owing to ill-health in May of this year. Mr. McCrea, of whom an illustrated biography was published in our issue of September 13, 1935, was a pioneer of bus transport in Northern Ireland, and was largely responsible for the formation of the Belfast Omnibus Co. Ltd. in April, 1927, of which he was successively General Manager, and (from January, 1930) Managing Director.

INDIAN RAILWAY STAFF CHANGES

Mr. R. Bonar has been appointed to officiate as Deputy Chief Mechanical Engineer, E.I.R., as from October 25.

Lieut.-Col. H. H. E. Gosset, R.E., has been appointed to officiate as Deputy Chief Engineer, E.B.R., as from October 28.

Mr. C. F. Gilbert, Deputy Agent (Provisional), E.I.R., has been appointed to officiate as Divisional Superintendent of that railway, as from October 10.

On return from leave Khan Bahadur Barkat Ali has been posted as Deputy Director, Railway Clearing Accounts, as from October 16.

Mr. D. C. Campbell has been posted as Chief Accounts Officer, N.W.R., as from October 9.

Mr. R. E. Marriott, Divisional Superintendent, E.I.R., has been granted an extension of leave for two months.

Mr. W. Coltman, Locomotive & Carriage Superintendent, A.-B.R., returned from leave and resumed his duties on November 1.

Lt.-Col. R. H. Stallard, Senior Deputy Agent, M. & S.M.R., has been granted leave preparatory to retirement, as from November 12. Mr. A. C. Rose, acting Junior Deputy Agent, has been appointed to officiate as Senior Deputy Agent, and Mr. S. M. Anwyl, Secretary to the Agent, as Junior Deputy Agent from the same date.

QUESTIONS IN PARLIAMENT

L.M.S.R. Developments

Mr. Neil MacLean (Govan—Lab.) on December 9 asked the Minister of Transport whether his attention had been drawn to the programme of renewals for 1938 announced by the London Midland & Scottish Railway Company, the sum to be spent being £1,000,000; whether he could state how much of that was to be spent in Scotland; and whether any locomotives, passenger coaches, and freight vehicles would be built in the railway works of that group in Scotland.

Dr. Leslie Burgin (Minister of Transport): I am in communication with the L.M.S.R. Company and will inform the hon. member of the result.

South African Railways

Lieut.-Commander R. Fletcher (Nuneaton—Lab.) asked the Secretary to the Overseas Trade Department whether British firms were invited to tender for the 23 locomotives ordered from Krupps by the South African railways.

Mr. R. S. Hudson (Secretary to the Overseas Trade Department) wrote in reply: Yes, sir. Tenders were invited and were submitted by certain United Kingdom manufacturers for a number of locomotives of which the 23 reported to have been placed with Krupps formed part.

Argentine Railways

Mr. W. S. Liddall (Lincoln—C.) on December 13 asked the Secretary of State for Foreign Affairs, if he could say whether the Argentine Government had yet granted repeated requests that representatives should be elected to form the commission under the Argentine Transport Co-ordination Act passed a year ago; and, if not, would he, on behalf of British subjects who were suffering loss by the inability of the railways to obtain the promised redress, make representations to the Argentine Government.

Mr. R. A. Eden (Secretary of State for Foreign Affairs): I would refer my hon. friend to the reply given to him on November 29, from which he will see that the British railway companies concerned are in communication with the Minister of Public Works and that no request for assistance has been received from them by His Majesty's Government.

Brazilian Railways

Sir Philip Dawson (West Lewisham—C.) on December 15 asked the Secretary of State for Foreign Affairs if, as an alternative to a Brazilian exchange clearing, he would ask the Brazilian Government to collaborate with the British Government and the Governments of the United States of America, France, the Netherlands, and Portugal in a plan for international control of Brazilian maritime customs, in order to assist Brazil to terminate the repudiation of her obligations on foreign loans obtained for developing Brazilian resources, railways, and public utility services.

Mr. R. A. Eden (Secretary of State for Foreign Affairs): No, sir.

French Indo-China Railway

Mr. G. Le M. Mander (East Wolverhampton—Lib.) on December 15 asked the Secretary of State for Foreign Affairs if he would consider the advisability of exercising the right of Great Britain, under Article 11 of the Covenant of the League of Nations, to bring to the attention of the Council the action of Japan in threatening France that the French railways from Hanoi, in Indo-China, running across the border into China, would be bombed if the transit of arms through French Indo-China continues.

Mr. R. A. Eden (Secretary of State for Foreign Affairs): No, sir. This does not seem to be a matter for the initiative of His Majesty's Government.

Parliamentary Notes

Resiting Blackpool Central Station

A Bill which is being promoted by the Corporation of Blackpool provides for the carrying into effect of an agreement between this body and the London Midland & Scottish Railway Company for the removal of the Blackpool Central railway station to another site in the town.

Forthcoming Events

Jan. 4 (*Tues.*).—Institute of Transport (Bristol), at University, 6 p.m. Debate.

Institute of Transport (Metropolitan Graduate), at Inst. of Electrical Engineers, Savoy Place, W.C.2, 6 p.m. "Principles Underlying the Issue of Goods Vehicle Licences," by Mr. G. Searle.

Jan. 5. (*Wed.*).—Institution of Heating and Ventilating Engineers (London), at Inst. of Mechanical Engineers, Storey's Gate, S.W.1, 7 p.m. "Air Conditioning Factors," by Mr. T. Chester.

Royal Society of Arts, John Street, London, W.C.2, 3 p.m. "Railway Wonders of the World," by Mr. Cecil J. Allen.

Jan. 6 (*Thurs.*).—Institute of Metals (Birmingham), at James Watt Inst., 7 p.m. "The Relationship between Mechanical Properties and Liability to Breakdown in Service," by Mr. L. Schuster.

Institution of Electrical Engineers, Savoy Place, London, W.C.2, 6 p.m. "Safeguards against Interruptions of Supply," by Messrs. A. Clothier, B. Leeson, and H. Leyburn.

Institution of Locomotive Engineers (London), at Inst. of Mechnical Engineers, Storey's Gate, S.W.1, 6 p.m. Informal Meeting.

Jan. 7 (*Fri.*).—Institute of Transport (Nottingham Graduate), at Guildhall, 7 p.m. "Operating a Scattered Fleet," by Mr. L. Gage.

Omnibus Society, at Inst. Marine Engineers, The Minories, London, E.C.3, 7 p.m. Annual General Meeting and paper by Mr. Charles E. Lee.

Railway Students' Association (Edinburgh), at Goold Hall, St. Andrew Square, 7.30 p.m. "Recent Trends in Railway Progress Abroad," by Mr. C. E. R. Sherrington.

Great Southern Railways (Ireland) Application for Increase in Tariffs

This application for an increase of approximately 5 per cent. in rates and fares was heard by the Railway Tribunal in Dublin, which pronounced judgment, ordering the increase as from January 1, 1938

This application was heard at the fourth annual review of standard revenue under Section 54 of the Railways Act, 1924, by Judge O'Brien, Chairman of the Railway Tribunal on November 16, 17, and 18.

Mr. Phelps, K.C., who with Mr. Kelly, K.C., and Mr. Healy, appeared for the company, stated that the standard revenue of the applicants was originally fixed at £1,169,899 in February, 1927, but by order of the Tribunal dated December 15, 1933 (which was subsequent to the reduction in capital), the standard revenue was adjusted to £561,189. The net revenue and the standard revenue had been as under:—

Year	Standard revenue £	Net revenue £
1931 ...	1,169,899	670,444
1932 ...	1,169,899	475,086
1933 ...	865,544	388,454
1934 ...	561,189	459,252
1935 ...	561,189	497,113

No allowance was made to remunerate the company in respect of extra capital raised since standard charges were fixed. The amount of this capital was £637,892.

During the years 1936 and 1937 considerable increases had taken place in the cost of stores and materials necessary for the carrying on of the railway and further increases are likely in the future. Increases in salaries and wages had also been imposed on the applicants during those years. The deficiency between net revenue and standard revenue was likely to continue and to increase. It was not due to lack of efficiency or economy in the management of the railway undertaking.

The applicants claimed that, under the Railways' Act of 1924, they were entitled to an order modifying the standard and exceptional charges so as to enable them to earn the standard revenue with allowances for additional capital, and that such a modification should be based on an all-round increase of at least 5 per cent. on all standard and exceptional charges. The company contended that a change of circumstances had arisen which was certain to continue.

The Railways Act, of 1924, Sections 53 and 54, state that the tribunal shall take into consideration the charges in respect of any business carried on by the company ancillary or subsidiary to the railways, the charges for which were fixed by the Ministry of Commerce, and if, in the opinion of the tribunal, the company was not making, or had not taken reasonable steps to enable it to make adequate charges in respect of such business, the tribunal should, in fixing the charges under this part of the Act, take into account the revenue, which would be produced by any such business if adequate charges were in operation. By Section 18 of the Act of 1932, road transport business was deemed to be business ancillary or subsidiary, and the charges not subject to the tribunal.

This was altered by the Road Transport Act, 1933, which enacted that the charges to an authorised carrying company (namely, the railway company) under a merchandise licence should be fixed by the tribunal, and the (road, &c.) revenue be considered revenue from other sources. The company did not ask for any charges in the annual reviews in 1934, 1935, or 1936, as it did not see any material prospect of being able to increase net revenue by any modification. However, expenditure was increasing by leaps and bounds, and more than counterbalanced any improvement in trade. The increase sought would not enable the standard revenue to be reached.

Mr. Phelps submitted that the object of whatever modifications were made was the earning of the standard revenue or even help to attain to it. He said it might be argued that the company could not be granted a modification which would divert traffic from the railway, but it would be found during the inquiry, that there must be a diversion of traffic, though the net result would enable the company to earn a sum that was nearer the standard revenue, having regard to all circumstances.

In the case of the inability or alleged inability of certain traders to bear an increase in tariffs, it was submitted that this was not a matter that the tribunal should regard, but rather it should decide whether the company would be in a worse position or if its revenue would increase. An argument had been put forward that the increase would not be in the public interest, but it was submitted that the law regarded the realisation of the standard revenue to be in the public interest. It was the railway the Act considered and nobody else.

The bus business made a considerable net profit, but the road merchandise business had been showing, and was likely to continue to show, a deficit, a fact that the company was entitled to take into account before making its calculations, and to charge, remuneration of capital against net revenue. The capital of the passenger and freight road ventures was £1,045,000. The estimated receipts for railway working were £3,145,013; in 1936, the actual receipts were £3,262,201. The estimated expenditure was £3,018,145; last year it was £2,857,233. If the increase were granted, it would result in a considerable increase in gross receipts, but the benefit would be swept away by a large increase in charges; it was estimated that next year working expenditure would be increased by £161,000, and the company should not be left with the same methods of earning revenue as before, when more revenue must be obtained if there was to be any approach to standard revenue.

Mr. Phelps stated that the Government, when passing the Conditions of Employment Act and the Widows and Orphans Pensions Act, had little thought of the cost of between £30,000 and £40,000 which these demanded from the railway company. He also referred to the loss on the road lorry service, and the benefits it gave in other ways. Reference was made to the contentions of the Ministry that a case had not been made out for an increase in standard charges, and that the result might be obtained by a general increase in exceptional rates and exceptional fares, which Mr. Phelps did not consider feasible.

Mr. Morton's Evidence

Mr. W. H. Morton, General Manager of the Great Southern Railways, then gave evidence, and was examined by Mr. Kelly, K.C. Mr. Morton agreed that it was his principal submission that any variation in the general rates and charges of the company which would enable earnings to approximate to the standard revenue, was a variation to which the Company was entitled, pursuant to the Railways Act, if it could bring itself within the provisions of the Act. Mr. Morton said that the matter had been given very careful consideration and eventually it was decided that the application should be for a general all-round increase of 5 per cent. He realised that it would be impossible to increase the traffic rates, both passenger and goods, by the full percentage because there must of necessity be some diversion of traffic. If he had thought that there was any chance of getting more than 5 per cent. the application would have been for a higher figure, probably 10 per cent., because he thought it would be shown during the hearing that the increased charges, which arose from matters outside the company's control, would not be met or nearly met by the additional receipts which he hoped would accrue if the 5 per cent. was applied.

Mr. Morton continuing, said he thought that if the Court awarded an increase of 10 per cent., the application would defeat its own ends, and he believed that a 5 per cent. increase applied to all traffic was so moderate that it would hardly be felt. It would not affect any present level of prosperity in any industry or prevent production of any kind. Asked by Mr. Kelly, if he thought that an all-round increase of 5 per cent. was the best way of approaching the subject, Mr. Morton said he was sure it was, because

if exceptions were made, there would be no end to claims for similar treatment. He went on to say: "It would interfere with classification and the different commodities in each class. We found that the actual scales of charges have, as it were, marshalled the various traffics into suitable relation with one another. We have been to the tribunal to secure reduced charges. Some have been reduced below 40 per cent., but in applying those everything has fallen into a suitable relation with everything else and our proposal is to apply the flat 5 per cent. on things as they are." Mr. Morton pointed out that evidence would be given regarding exact figures for 1936 as they had applied to the railway industry. It was common knowledge that in every other industry, both wages and prices of materials had taken a steep rise. His administration knew this because its purchases included not only ordinary stores, but big supplies like coal, steel, rails, and sleepers; it was obvious that they were in a world of rising prices and the railways felt it as much as anybody else. His estimates did not contemplate an increase in maintenance costs, and he had come to the conclusion that until there was greater prosperity, all they could do was to maintain the service in safety, to reduce renewals as low as possible, and to do only such work on the line as was absolutely necessary. His proposals for 1937 were based on the same quantum of work as 1936, and in 1938 he did not intend to increase it.

Mr. Morton Examined

HIS LORDSHIP: "Is the undertaking in a safe condition?"

MR. MORTON: "It is."

MR. KELLY: "Now, while expenditure has risen owing to some of the causes you have just enumerated, net revenue has not advanced at the same rate?"

"No."

"But is it true, as pointed out by the Minister, that actual tonnage has an upward tendency as well as the numbers of passengers carried?"

"Yes, as regards 1936."

"But your experience since the end of 1936 is distinctly to the contrary? Traffic is decreasing and receipts are down £40,000 below 1936 up to the present?"

"Yes, the Government return of livestock exported shows that for the first ten months of this year no less than 18,000 fewer animals were exported from the Free State than in 1936, and that certainly is not an upward trend and we feel the loss of that traffic very badly. That is for 10 months only."

"You do, however, admit that there will be a diversion both of goods traffic and of passenger traffic to the extent of about two per cent?"

"Yes."

"And you think that that will be most accentuated in the first year?"

"I think it will tend to decrease. I think that we can come back next year to ask for another 5 per cent. because it will be necessary. I would like to get the exact figure of the increased expenditure owing to the social legislation of the Government. This social legislation, particularly the Conditions of Employment Act, cost the company in 1936 £22,827. The Act was not in force throughout the whole of the year, and our estimate of the cost of this year and in future years is that it will be over £30,000 for a full year. Where is the company going to get that £30,000, unless they can get it from increased receipts? If we cannot get it from increased receipts it becomes a direct deduction from net revenue. We have no means of finding that money except from increased revenue; either that or the net revenue will suffer by that amount. The Widows and Orphans Pensions Act cost the company £12,000 in 1936."

"That will be the same next year?"

"Yes, so long as the staff remains at its present level. I would like to tell the Court that the increase in wages for 1937 over 1936 is £66,500, actual. Our estimate of 1938 wages over 1936 is £100,000. Now, the Minister has drawn attention to the fact that, so far as the Conciliation Grades are concerned, these rates were in operation years ago, but I would like to make the point that this is an increase. We had a review of standard charges last year, but this has occurred since that time and is an added expenditure. Again materials in 1938 will cost £76,744 more than in 1936, and unless additional revenue can be got to meet that charge the net revenue again will fall by that amount."

"You do not anticipate that the workers' demands are at an end?"

"No. I would like to make this point, that the reference in the Minister's document to cut on wages refers only to the class of men and the grades of men who appear before the Railway Wages Board, but in addition to those we have thousands of men whose wages have to be dealt with separately. They are tradesmen, shopmen and labourers. We have threatened strikes every week."

"I think you hold the view that any strike, such as the recent builders' strike, has its reactions and tends to send up prices?"

"Yes, the result of the builders' strike in the city of Dublin and the city of Cork has set every other trades union at the same thing, and we have applications now which will run into nearly £20,000 a year more if they are granted, and we are threatened with a strike even this week if they are not granted. These growing charges are tremendous and the reason I emphasise them is that everything has tended to increase since 1936."

Road Traffic

"You refer to Section 9 of the Road Transport Act of 1933, the section containing the prohibition of carrying business by unlicensed persons?"

"That Act was excellent in its intentions, but it has been a failure in application, certainly from the railway company's point of view."

"You failed to knock out the pirates?"

"Yes. All merchandise traffic on the roads can only be carried under the law (outside certain areas) by licensed hauliers, but it is being carried today in a great many instances by men without a licence and even in the case of licensed vehicles we find in some cases no less than from 25 to 50 names on one licence. That is, 50 people own one lorry and they do all their cartage without any licence. They do not need it because they say they are carrying their own goods. We were given the opportunity of acquiring licensed vehicles and, so far as our capital resources went, we did. We have acquired over 200 of the larger hauliers' businesses, but there are still nearly 1,000 licensed hauliers, and so long as we have to compete with them at their low rate of wages and their low standard of maintenance, while we on the other hand have to pay trades union rates and maintain our stock to a high standard of efficiency, I cannot see this £20,000 surplus of receipts over expenditure being realised. In fact, I am sure it cannot be realised in the next five years."

"Have you instances also of the expropriated licensees turning up again and carrying on their old trade?"

"Yes; they come along under the guise of wholesale merchants. They often claim that the goods they are carrying are their own. A man buys them at one end of the journey and sells them at the other, and the difference between the selling price and the purchase price pays the carriage. The evasions of the Act are widespread, and we have asked the Minister to amend the legislation."

"The effect of the low rates charged by the class of hauliers you complain of has the inevitable effect of depressing your rates to an uneconomic level?"

"Yes."

"Take a concrete case. A rate from here to Ballina by one of these hauliers has the effect of forcing you to give the same rate. He has really a greater effect on the haulage of the country than he ought to have, having regard to the amount of tonnage he carries?"

"Yes; that is one of the basic facts that makes a loss inevitable."

HIS LORDSHIP: "If you had these several hauliers who are evading the Act, as Mr. Morton puts it, off the road, then you might be able to earn a profit?"

"There is no doubt we should."

MR. PHELPS: "It was the 1935 Act that clenched it, the second section of the 1935 Act where they put on the road men who were carrying their own goods or not for reward, &c."

MR. KELLY: "Of course, an order of the tribunal authorising you to raise

road rates would be absolutely useless? "

"It would be futile."

Operating Details and Financial Considerations

MR. KELLY: "You have been familiar with coal all your life both as Chief Mechanical Engineer and as General Manager. It is an article that looms very large in railway expenditure? "

"Yes. We consume 240,000 tons annually. And in our estimate of increased charges for 1937 and 1938 very little is included as increased cost of coal, because—and I hope it is an instance of good management—we saw the shadow before it fell, and we have made our contracts up to the end of 1938 at the same price. As regards freight charges, we have called for tenders to find out at what rate coal can be carried to Dublin, Cork, and Waterford, and the cost works out at 10d. a ton more than last year. Every penny increase means £1,000 a year, and that is a total additional sum of £10,000 a year which must be met out of increased receipts or reduce the net revenue."

MR. KELLY: "The capital expended on passenger road transport is set out by the Minister at £473,783. That is correct, is it not? "

"It is substantially correct."

"And merchandise £522,854? "

"Yes."

"Now, assuming that all those figures are correct, I think I am right in saying that no capital was issued by the company in respect of capital expenditure on passenger road transport? "

"No."

"That was financed from the resources of the company itself? "

"Yes. Of course, the last issue of capital—£657,000—was mainly for that, but originally none was issued."

"There was no separate debit of interest on capital account in respect of this £473,783? "

"That is so."

"You claim that for the purposes of this inquiry there should be an appropriate interest on the capital expended on the passenger road transport undertaking? "

"Yes."

MR. KELLY: "Well, now, Mr. Morton, to deal finally with the capital, you have no capital resources at present adequate to the requirements of the company? "

"No, we could not embark on any new schemes of any magnitude of any description."

"You do, of course, anticipate that capital expenditure will be necessary? "

"We could spend millions and spend it well if we had it."

"Will you point out the connection between that and the obtaining of standard net revenue as far as possible? You are not in a position to go on the market at present, and every pound that brings you nearer your standard net revenue places you in a better position to obtain accommodation? "

"Under the Railway Acts we have powers regarding stock, but we have no further borrowing powers regarding debentures. If we were in a stronger position we could issue stock for £800,000; we cannot issue debentures. Our powers as regards debentures are exhausted."

"Will you give my lord some of the instances in which the most economical working of the company is insisted on? "

Up-to-Date Methods of Maintenance and Renewal

"Various economy commissions have visited every station to ensure minimum expenditure of materials, salaries, and wages. The staffs have been reduced to the lowest possible number necessary to carry out the company's work. Railway services, as such, are now being operated by a staff which is 5,000 less in number than in 1925. That is the railway only. There are 2,500 men employed on the road services, but that is an additional service. We have only done such renewal work as was necessary to preserve the safety of the line and working. Rolling stock maintenance and renewal has also been on a low scale to keep expenditure within bounds. The number of new carriages is not as great as it should have been. The taking up of old rails and sleepers is now done by electrically driven machinery mounted on trucks to run on the railway. Relaying of new permanent way is done by the same method. We assemble the sleepers and rails together. We can lay half-a-mile in 4 hr. Weed spraying is now done by a specially designed weed spraying train which travels over the whole system resulting in a great economy in the temporary staff. In some of these things we have led the British railways both in weed spraying and in track laying. Wherever possible, where traffic has declined, stations are being converted to halts. Electric automatic colour signalling has in many instances replaced semaphores and all the connecting wires and rodding, and this has resulted in a reduced number of signal boxes. With the consent of the Minister for Industry and Commerce about 120 miles of unremunerative railway have been closed. The districts have been made less in number and the number of superintendents and inspectors has been reduced. I can assure the Court that every possible economy has been effected."

"Deal with efficiency in the management."

"Every one of these things filters through to the General Manager."

"You say that the company is efficiently managed? "

"Yes."

HIS LORDSHIP: "I have to inquire into that. I have to ascertain is the deficiency due to lack of efficiency."

"Inefficiency would consist in allowing expenditure to go out of bounds."

HIS LORDSHIP: "That is economy. Apart from economy, what about efficient management generally? "

MR. KELLY: "May I put it this way. Having regard to all your experience of railway management do you know of any railway more efficiently run than the Great Southern Railways at the present time having regard to the conditions of the day? "

"No; not having regard to the conditions under which we are working. I am convinced that no other Board of Directors could have got more net revenue out of the concern than we are getting."

HIS LORDSHIP: "Is it efficiently managed in every particular? "

"Yes. We have appointed first class staff officers, every one an expert in his own profession and no stone has been left unturned to get absolute efficiency within the means at our disposal. We are trying to make bricks without straw."

HIS LORDSHIP asked Mr. O'Brien, as representing the Department of Industry and Commerce, if he wished to ask the witness any questions.

MR. O'BRIEN: "The evidence as regards wages has put a different complexion on the thing. That shows circumstances we were not aware of.

HIS LORDSHIP: "You seem to be very well acquainted with the Act of 1924. Section 54 (6) says I am to have regard to like considerations as when fixing charges in the first instance. I am to have regard to the maximum development. As far as the public interest is concerned are you consulting that in every way you can? "

"Yes; we are; we have a Traffic Manager in touch with every trader in the country. Mr. Floyd is well known to every trader in the country."

"And are you trying to develop? "

"Yes, by personal interview with the people."

"Can you tell me what is the effect of existing charges on traffic, both generally and particularly? "

"Except that the state of trade is dwindling at the moment. If trade was on the upward trend our traffic would go up. Existing charges are not decreasing traffic.

"You say that the present trend is for a slight upward trend in carrying? "

"No; that was up to the end of 1936. I have instanced the cattle trade."

"The only other thing I want to say is this: Assuming for a moment that the cattle trade is established that the company would be entitled to the benefit of the modification asked for, do you say that there will be only a diminution of two per centum? It will be an all round benefit on every class of traffic."

"Yes."

"And it would, you say, result in an increase in the revenue? "

"Yes."

"It would bring you into a better financial position? "

"Yes. If we get 5 per cent. the net revenue will fall but by less than if we did not get the increase."

Ancillary Business

HIS LORDSHIP: "Now, the next thing is this ancillary and subsidiary business. I am to consider the charges and have regard to the financial results. Now, the first thing is mails and parcels post. Hotels is the next thing. May I ask you, are these hotels conducted to the best ability you can put into them?"

"Yes; the condition of the hotels and the patronage is improving. Look at the net profits—£7,000, £9,000, £14,000."

"You anticipate an increase of £2,000 this year?"

"Yes."

"Collection and delivery. How does that stand with reference to financial results? Is that a paying proposition?"

"It is a proposition for which the railway has to pay. There is a credit given to the Road Department which does the collection and delivery."

"Is it a necessity?"

"Yes."

"And it is worked as economically as possible?"

"Yes. And the necessity is that our competitors give a door-to-door delivery. We do that for goods carried on the railway and at the lowest cost."

"Is it a necessity?"

"Yes. It is a necessity for all railways, not only the Great Southern."

"You say you do it as efficiently as any other railway does it?"

"Yes."

MR. O'BRIEN: "To remove a possible misconception. You rather gave the impression in your evidence that the operation of the Road Transport Acts was more or less not properly looked after?"

"No, no."

"That there were people travelling without licences and breaking the law generally?"

"That is true."

"Well, now, you are aware that the enforcement of that Act is in the hands of the same people as any other Act?"

"Yes, and they are giving us the greatest help."

"And that practically every day of the week there is a prosecution?"

"That is true."

"Well, now, that rather indicates that traffic is not being carried today by people without licences practically regardless?"

"The trouble the Police Department has is dealing with the man who asserts that the goods in his lorry are his own.

"Well, very often that has been proved and the guards have informed you that the property was the carrier's own and that therefore he was not breaking the law, and the goods would not in any case come to you?"

"There is no doubt that wholesale and widespread evasion of the Acts is taking place. But we appreciate all that your department is doing for us. We are urging the Minister to introduce amending legislation on lines which we ourselves have suggested and I think when that is done, although the whole of the evasions is not likely to cease, that some betterment will result."

"I do not like to leave it at that. As I understand the position it is that the Minister has indicated to you that he is prepared to consider amendments to the legislation that would secure the tightening up you desire, if you will put forward amendments which he considers feasible, and we are waiting for them still?

"We are trying to do that."

"The position is that you are asking the Minister but that the Minister is waiting for you?"

"I am glad to know he is waiting for us."

HIS LORDSHIP: "Is the deficiency that exists likely to continue?"

"The deficiency in the net revenue, yes."

"And you do not know when it is going to stop?"

"That is right."

Mr. Morton Re-examined

In subsequent re-examination regarding his estimate for established wages, Mr. Morton stated it was largely made up of tradesmen's pending demands and applications and threatened strikes. There were separate demands which if granted would amount to £40,000. These increases had been given by other employers in Dublin, and that is why he estimated that in 1938 he would also have to make increases in rates of wages.

When questioned on the suggestion by the Minister that the company was not charging the fares it might on the transport business, Mr. Morton stated there was a statutory order issued by the Minister which fixed the maximum fares on all the buses at 1½d. a mile, and most of the fares were within that figure. He stated that the question of charging the maximum fare was under consideration. It was felt that if the application was granted the railway rates and fares would be increased. That might drive people off the railway to the buses. It was the intention to have a simultaneous increase. Asked what prevented charges from being put into operation which would produce a greater revenue, Mr. Morton answered "Public opinion, particularly in the City of Cork, where we do a tremendous lot of bus work." In regard to long distances, charges were at their present figures because there were other forms of competition, in the shape of thousands of motorcars. Ford cars were cheap and five, six or seven people at a squeeze could be carried by such cars, and that was where the passengers would go. He thought the company struck the economic medium. Mr. Morton ended by saying that the company viewed the present wages as abnormal, and would do everything possible to resist the increases.

Messrs. Reade and Hartnell Smith give Evidence

Mr. Robert Reade, Commercial Assistant to the Traffic Manager, gave evidence dealing with traffic questions on behalf of the company. Among his statements were that the reason the company had not applied in previous years for an increase in charges was that it was influenced by the trade depression, and the state of the country due to altered conditions of import and export trade, the home industrial revival, and the unrestricted road competition. Now that the home industrial movement was progressing favourably, and although road competition was still rife, it had somewhat abated, in consequence, among other causes, of the many acquisitions of competing road hauliers' licences, and these considerations convinced the company that a moderate increase in charges would improve net revenue materially without adversely affecting the present trend of trade and industry. The company felt that an increase in transport charges would not have any greater effect in discouraging or diverting business than an increase in the price of coal or other materials, or of labour. The cost of everything had advanced, and as the value of the individual article had increased, so they were able to bear a slight increase in transport costs, and thus enable the company to secure a fair return of revenue for services rendered.

Mr. Reade suggested that the increase if granted, would be operated by means of a ready reckoner, which would show in parallel columns the existing charge and the corresponding additions to the existing charge. He estimated that the increase might result in a certain loss of traffic, but that about 80 per cent. of the passenger and about 70 per cent. of the merchandise increase would be secured, although the loss on the livestock traffic might be greater by reason of the tendency to use road transport. He expressed the opinion that coal and mineral traffic would not be affected to any appreciable extent by an increase of 5 per cent. The Court was impressed by Mr. Reade's evidence showing the very small extent to which commodities would be affected by the proposed increase. It was shown that in the case of household commodities the proposed increase in rates was insignificant compared with the increased price of commodities.

Mr. Reade also dealt elaborately with the question of smalls charges, and satisfied the Court that the application of a 5 per cent. increase to the rate graduations as well as to the "additional charge per consignment" shown at page 20 of Statutory Rules and Orders, No. 5, would produce an addition of 5 per cent. or thereabouts, to the present amounts chargeable on smalls consignments. It was pointed out that were the increase of 5 per cent. applied to "the additional charge per consignment" only, and

not to the rate graduations, the resultant smalls charge would in many cases exceed the 5 per cent. to an appreciable extent. A considerable proportion of revenue was derived from smalls, and bearing in mind the time and labour involved in handling this description of traffic an increase of 5 per cent. on smalls receipts would be of material benefit to the company. It was of interest to note that smalls in Great Britain were automatically excluded from the 5 per cent. increase through the operation of the fractions rule. The bonus additions per consignment for British smalls were generally less than 10d.

Mr. Hartnell Smith, Accountant, gave exhaustive evidence, proving his facts and figures with statements submitted to the tribunal, and was examined by Mr. Phelps. Mr. Smith stated that the charges in connection with ancillary businesses and other sources of revenue were the most economic and the best charges which could be obtained. He agreed that every branch of the business was worked efficiently and with economy.

The general evidence which Mr. Hartnell Smith gave would occupy considerable space, and as it is reflected by the judgment which we hope to summarise later, it is not recorded in detail here.

Mr. J. P. Meadows, Stores Superintendent, gave evidence to prove the increased costs of stores and materials.

Finally, criticisms by the Minister for Industry and Commerce were dealt with at length, and it was explained that the position of the company justified a far greater increase, but from the evidence of Mr. Morton and Mr. Reade, Counsel contended it was not feasible to increase the rates at present by more than 5 per cent. It had been intimated that the company might find it necessary at a subsequent date to apply for a further increase.

This concluded the sitting of the Court, and judgment was delivered on December 3, as already recorded in our issue of December 10.

CONTRACTS AND TENDERS

New Doncaster Central Station, L.N.E.R.

Plans for the reconstruction of Doncaster Central station, outlined in our issue of February 28, 1936, are now complete and contracts for a substantial part of the work have been placed. The remodelling of the station will remove a bottleneck on the L.N.E.R. main line to Scotland, and new station buildings of pleasing modern design will be erected. Contracts have been placed with G. Longden & Son Ltd. and Caffin & Co. Ltd. for structural alterations and subways, respectively.

The Bengal Nagpur Railway Administration has placed the following orders:—

Superheater Co. Ltd.; superheater elements and regulator cam shafts.

Linley & Co. Ltd.; copper firebox plates.

Uddeholm General Agencies Limited; boiler and superheater flue tubes.

Steel, Peech & Tozer Limited has received an order for 250 steel tyres for wagons, from the Central Argentine Railway.

G.W.R. New Works

The G.W.R. announces the following works to be undertaken :—

Bridge Reconstruction.—The superstructures of the bridges carrying the railway over a public road, canal and occupation road near Rednal and West Felton station are to be reconstructed.

Hotel Modernisation.—Extensive modernisation is to be undertaken at the Fishguard Bay Hotel. Lavatory basins, with hot and cold running water, are to be provided in nearly all the bedrooms, additional bathrooms are to be constructed, a cocktail bar is to be installed, and the water-heating system brought up to date. The work on the water-heating system will be carried out by the Norris Warming Co. Ltd., and the remainder of the work by F. Holcombe & Company.

Track Maintenance.—The motor trolley system of maintenance is to be introduced on fourteen miles of single line on the Minehead branch.

Rolling Stock.—In order to ensure smooth running on the Paddington-Birmingham route, restaurant cars are to be fitted with the latest pattern six-wheeled double bolster bogies, in place of the present four-wheeled bogies.

WORKS AT STATIONS AND DEPOTS

Acton.—For the purpose of dealing with the heavy parcels traffic at this station, new office accommodation, a loading bank and a bridge serving the platforms with electric lifts are to be provided.

West Ealing.—In order to deal with growing traffic following upon extensive housing developments in the locality, siding accommodation for wagons of coal and coke is to be extended.

The Crown Agents for the Colonies have recently placed the following orders :—

F. Braby & Co. Ltd.; corrugated mild steel sheets.

Wolverhampton Corrugated Iron Co. Ltd.; galvanised corrugated steel sheets, and mild steel sheets.

General Electric Co. Ltd.; generating plant.

Stewarts and Lloyds Limited; wrought and galvanised iron pipes and bends.

Eyre Smelting Co. Ltd.; gunmetal.

Phosphor Bronze Co. Ltd.; locomotive brasses, locomotive carriage and wagon spares, phosphor bronze and white metal.

Newport & South Wales Tube Co. Ltd.; locomotive steel tubes.

Universal Steel Tube Co. Ltd.; locomotive steel tubes.

Billington & Newton Limited; metal ingots.

G. Kent Limited; meters.

Whitehead Iron & Steel Co. Ltd.; mild steel.

Dorman Long & Co. Ltd.; mild steel plates, rails, fishplates, and round steel joists.

South Durham Steel & Iron Co. Ltd.; mild steel plates and pressed steel tank.

Colvilles Limited; mild steel squares and steel sleepers.

National Gas & Oil Engine Co. Ltd.; oil engines.

Wm. Baird & Co. Ltd.; pig iron.

Stanton Ironworks Co. Ltd.; piping and flanges.

Vulcan Foundry Co. Ltd.; piston rings for locomotives.

Brown Lenox & Co. (London) Ltd.; pressed steel tank.

United Steel Cos. Ltd.; rails.

Peckett & Sons Ltd.; spares for locomotives.

Motherwell Bridge & Engineering Co. Ltd.; steel corrugated plates.

Horseley Bridge & Thomas Piggott Limited; steel piling.

Guest, Keen, Baldwins Iron & Steel Co. Ltd.; steel sleepers.

Darlington Railway Plant & Foundry Co. Ltd.; switches and crossings.

General Electric Co. Ltd.; telephone exchange equipment.

Ericsson Telephones Limited; telephone switchboards.

Thos. Firth & John Brown Limited has received an order from the Bombay, Baroda & Central India Railway Administration for 272 wagon axles to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton.

William Asquith Limited has received an order for one 4-ft. 9-in. portable radial drilling machine from the Central Uruguay Railway.

The Bengal-Nagpur Railway Administration has placed orders with Brown Bayley's Steel Works Limited for 50 straight axles, and with William Beardmore & Co. Ltd. for eight crank axles.

Diesel Locomotives Required for S. Africa

The Union of South Africa Tender and Supplies Board, Pretoria, is calling for tenders (Tender No. S.O. 572) for the supply and delivery of two heavy duty, compressorless, solid injection, two or three cylinder, vertical four stroke, water-cooled diesel-engined locomotives of approximately 35 h.p. and designed to work on a 2-ft. gauge and 30-lb. rails. Minimum gross load will be 15 tons up a 1 in 20 gradient. Tenders endorsed "Formal Tender No. S.O. 572" should reach the Secretary of the Union Tender and Supplies Board, 271, Visagie Street (P.O. Box 371), Pretoria, by January 13, 1938. A copy of the specification and general conditions of tender may be borrowed from the Department of Overseas Trade, London, S.W.1.

The South African Railways & Harbours Administration is calling for tenders (No. 1580) for the supply and delivery of approximately 88 tons of steelwork (including necessary rivets, bolts and nuts) for a subway at the east end Krugersdorp station and an overhead footbridge at Battery Street, Mayfair. Tenders endorsed "Tender No. 1580 for Bridgework" should reach the Chief Stores Superintendent, South African Railways & Harbours Headquarters, Johannesburg, by February 7, 1938. A copy of the schedule of requirements and general conditions of tender, together with drawings, may be borrowed from the Department of Overseas Trade, London, S.W.1.

NOTES AND NEWS

American Railways Freight Rate Request Overruled.—A Reuters message from Washington states that the Interstate Commerce Commission has, without further comment, overruled the request by the railroads for an immediate increase in freight rates. The Association of American Railroads has asked for an increase of 15 per cent. in freight rates without waiting for the completion of the present hearings.

U.S.A. Railway Difficulties.—More than half the total increase in U.S.A. railway operating cost is due to new federal taxes and to the rising prices of materials and supplies and fuel which the railroads must buy. Because of the higher operating costs, the net railway operating income of Class I railroads in August, 1937, was 22 per cent. below that of the same month last year, and in September, 15 per cent. below September, 1936.

London-Glasgow Air Mail Contract Renewed.—For the third successive year, Railway Air Services Limited has been awarded the contract for the carriage of mails on the country's principal internal air route, from London to Glasgow, *via* Liverpool and Belfast. Since the company's inception in 1934, it has operated more than four million miles on internal routes, including over one million during the current year. The number of passengers carried this year to date is 31,000, equal to an increase of 42 per cent. over last year.

Road Accidents.—The Ministry of Transport returns for November of persons killed or injured in road accidents is as below. The figures in brackets are those for the corresponding period of last year :—

	Killed	Injured	
		Serious	Slight
England—			
Pedestrians	... 217 (280)	1,191	4,114
Others ...	... 271 (264)	2,254	8,046
Wales—			
Pedestrians	... 6 (21)	79	166
Others ...	... 9 (11)	118	287
Scotland—			
Pedestrians	... 33 (44)	197	465
Others ...	... 20 (19)	209	565
	556 (639)	4,048	13,643

The total fatalities for the preceding month were 618, comparing with the same figure in the corresponding period of 1936.

L.M.S.R. Station Garden Prize Winners.—Over 400 stations on the L.M.S.R. in England and Wales competed in the company's 1937 competition for the best kept station gardens. Special prizes have been awarded to : Alcester (Warwick), Atherstone, Charfield (Gloucester), and Knighton (Radnor). First prizes to : Weston (Bath , Broxton (Cheshire), St. Asaph (Flint), Ockendon, Walthamstow, and Bletchley. Second prizes to : Blencow Caton, Morecombe (Prom.), Baildon, Buckingham, Blumham, Willington (Beds.), Thatto Heath, Byfield, Black Horse Road, Harpenden, Lea Road, Redditch, and Alsager.

International Engineering Congress in Glasgow.—An international engineering congress, supported by a number of engineering societies, will take place in Glasgow next year during the period of the Empire Exhibition to be held there. Lord Weir has been elected President of the Congress, the dates of which are to be from June 21 to June 24 inclusive. Membership of the Congress will be open to members of any recognised technical society on payment of a fee of £2 5s.

Increasing Capacity of L.N.E.R. Laundries.—To cope with the increasing work now offering, the L.N E.R. has decided to renew the whole of the equipment at its Joppa (Edinburgh), and Colchester laundries, and to extend considerably the capacity of these two establishments. The company's York laundry was brought up to modern standards a year or two ago, since when the turnover has been increased by over 70 per cent. Every year the three L.N.E.R. laundries launder 18½ million pieces of linen. The increasing demands upon them arise from the growing popularity of the company's catering and hotel services.

The Railway Club Annual Dinner.—The 31st annual dinner of the Railway Club—which was founded in 1899—was held on Friday, December 10, at the Broad Street Station restaurant, London. Some 53 members and guests attended, under the chairmanship of Mr. Kenneth Brown, the President of the club. Mr. Charles E. Lee, Assistant Editor of THE RAILWAY GAZETTE, in proposing the toast of "The Railway Club," referred to the coincidence of the establishment in the closing years of the nineteenth century of a club to provide a medium of intercourse between amateur students of railways ; of a monthly paper devoted to intelligent popular interest in railways ; and of commercial motor transport. From a petrol bus, which went into service in London on October 9, 1899, public motor transport in Great Britain had now grown to the large totals of 50,000 buses and coaches, and 460,000 goods vehicles. This development had resulted in an added importance to the railways of that valuable section of the public which had an accurate knowledge of, and a keen interest in, both railway achievements and problems. In reply, Mr. Kenneth Brown paid a high tribute to our associated monthly publication, *The Railway Magazine*, in having faithfully and accurately served the student of railway matters for more than forty years, and said that at the present time it was better conducted and more varied and comprehensive than at any previous period of its career. The toast of "The Officers and Committee" was proposed by Mr. K. ffitch and responded to by Mr. H. A. Vallance, the Secretary of the club. Mr. L. H. Bailey offered the toast of "The Visitors," to which Mr. J. Brown replied. The proceedings concluded with the exhibition by Mr. L. T. Catchpole of a coloured film showing the construction and working of a model railway.

Stephenson Locomotive Society Annual Dinner.—Mr. J. Clayton, M.B.E., Personal Assistant to the Chief Mechanical Engineer, Southern Railway, was the principal guest at the annual dinner of the Stephenson Locomotive Society on December 11, held at St. Ermin's Restaurant, Broadway, London, S.W.1. Mr. J. H. Seaford, a Vice-President of the Society, proposed the toast of "The Guests," and counselled the ladies present to observe a certain tolerance towards the railway enthusiasm of their men folk—an enthusiasm that was normally innocuous, and might even prove useful. Mr. C. W. Rockett, of the District Passenger Manager's Office, Euston, L.M.S.R., replied for the guests. Mr. Clayton, proposing "The Stephenson Locomotive Society," described the locomotive as the greatest civilising influence the world had known. Whatever successors it might have, their development must follow the broad lines of progress already blazed by locomotive engineers. He hoped the society would be fruitful in its good work of championing the cause of the steam locomotive.

Staff and Labour Matters

Hours of Road Motor Drivers

Following the applications to the Minister of Transport by the Institution of British Launderers Limited, and the Associates Committee of the British Road Federation Limited, for a variation of the provisions of sections 19 (1) (ii) of the Road Traffic Act, 1930, which, as reported in our issue of November 29, were referred to the Industrial Court, the Minister of Transport has issued an Order varying the hours of drivers of "C" licence vehicles during the 1937 Christmas trading period as follows: "In the case of heavy locomotives, light locomotives, motor tractors and motor vehicles constructed to carry goods other than the effects of passengers and authorised to be used under 'C' licences, paragraph (ii) of sub-section (1) of Section 19 of the Road Traffic Act, 1930, shall be varied so as to provide that on not more than two days in each of the three weeks ending December 18, 1937, December 25, 1937, and January 1, 1938, respectively, the limit of twelve hours may be substituted for the limit of eleven hours imposed by the said paragraph in respect of the aggregate of continuous periods of driving."

Scottish Accident Inquiry

Sir Nigel Gresley's Evidence

As recorded in last week's issue, Lt.-Col. H. L. Mount, Chief Inspecting Officer for Railways, Ministry of Transport, opened an official inquiry at Edinburgh on December 16. The London & North Eastern Railway was represented by Sir H. Nigel Gresley, Chief Mechanical Engineer; Mr. G. Mills, Divisional General Manager, Scottish Area; Mr. G. A. Musgrave, Locomotive Running Superintendent, Scotland; Mr. R. Gardiner, Superintendent, Southern Scottish Area; and other officers.

Mr. R. Gardiner said that most of those killed were passengers in the Dundee train, occupying the last two coaches. The passengers fatally injured in the Edinburgh train, he said, appeared to have occupied the first three vehicles. It seemed clear that the majority of the passengers most severely injured occupied the coaches mentioned. He paid tribute to the "exceedingly high standard of rescue work and the assistance forthcoming."

Mr. G. A. Musgrave said that the first two coaches of the Edinburgh-Glasgow train were lying ahead of the engine, and the interlocked ends of these were found to be resting on the under-carriage of one of the coaches of the Dundee train. The two leading coaches of the Edinburgh train had therefore completely over-run the engine. The leading end of one coach of the Edinburgh train was resting on top of the tender of the engine.

Mr. G. Mills gave figures showing the number of killed and injured in each train as follows:—Edinburgh train—killed 13, injured 63; Dundee train—killed 22, injured nine. Altogether 109 persons were injured; but it was not possible to say where the others were placed.

Sir Nigel Gresley is reported to have said that the oldest vehicles were the second and fifth coaches of the Dundee train, built in 1906. The last coach of the Dundee train was completely squashed up. The underframe was turned completely round so that the two ends were adjacent. The lives of the driver and firemen of the Dundee train had been saved because the coal in the tender of their locomotive was held in place by a steel plate, with only a small hole to shovel the coal out. The driver and fireman of the Edinburgh train were also saved because their locomotive was not "squashed," although the first carriage of the train was pushed right over the tender.

"A good deal of publicity," said Sir Nigel Gresley, "has been given to the fact that these are what is known as wooden carriages. I want to make it quite clear that the carriages of the L.N.E.R. are made with heavy steel underframes and solid teak end sections. The result of this form of construction is that the weight of both the underframes and the body is rather on the high side. A typical carriage such as those of these trains weighs about 32 tons. Out of that 21 tons is steel, seven tons is heavy timber, particularly teak, and about four tons accessories. About three-quarters of the weight is made up of steel and one-quarter of heavily braced wood."

There were two kinds of steel coaches—those in which steel was used in the frames, and the heavy steel coach with steel body and collision compartments of special reinforcement at the end. The latter were largely used on American railways and to a limited extent on the Continent, but not at all in England. These steel coaches were approximately double the weight of the ordinary steel-framed coach. In the Castlecary accident, he continued: "If the pillars had been made of steel angles instead of teak and if the panels had been of one-sixteenth of an inch steel plates instead of teak, it is quite evident from the result of the collision that the steel members would have no chance whatever of withstanding the impact. The great heavy steel underframe was completely bent up. It is not possible to make a carriage which would withstand the impact of a great engine rushing into it at 50 miles an hour. It must collapse at the end. If it were possible to have a carriage which did not collapse, which was solid armour-plating, the energy would be imparted to the next carriage and so on right throughout the train."

After further evidence the inquiry was adjourned.

"Dublin's First Railway"

On December 6, Mr. Kevin Murray delivered a lecture under the above title to the Old Dublin Society. He described the bad state of the Dublin port at the end of the eighteenth century, when shoals in the channel were growing more serious every year, and the proposals for a ship canal from Ringsend to Dún Laoghaire which were abandoned because they were too costly. When Kingstown harbour was begun in 1816 the canal was again proposed, but a railway was suggested as being less costly, and a company was formed to build it. After great opposition the necessary Bill was passed in 1831. At first capital could not be raised and a loan of £75,000 was obtained from the Board of Works. Charles Vignoles was appointed engineer, and a contract for the line was awarded to William Dargan for £84,000, not including track, stations, engines, coaches, &c. The granite used was procured in Dalkey, and the limestone from Donnybrook. The actual cost of the completed line was nearly £60,000 a mile, making it one of the most costly railways in the world. The first train was drawn by horses in July, 1834, and the first steam train ran in the following October to Williamstown. The first train of a regular service was run on December 17, 1834. For Queen Victoria's visit in 1849 a State coach of Irish workmanship and materials was constructed. The first engine built in Ireland was made by the company and put into service on April 4, 1841; it was named the *Princess*. Other engines built later by the company worked very well, and the last of them was scrapped in 1887. The company early adopted half-hourly services, and continued the system until the war of 1914-19. Season tickets were introduced in 1835, and many other concessions to travellers granted about the same time concerned workers, hawkers, and others. In the eighteen-forties special tickets were issued to "hikers."

Exports of Railway Material from the United Kingdom in November

	Nov., 1937	Nov., 1936	Eleven Months Ending Nov., 1937	Eleven Months Ending Nov., 1936
	£	£	£	£
Locomotives, rail	35,984	104,937	901,949	1,200,434
Carriages and wagons	125,863	191,351	2,576,224	1,243,700
Rails, steel	136,559	86,187	1,289,274	1,104,358
Wheels, sleepers, fishplates and miscellaneous materials	174,626	101,404	1,560,486	1,351,651

Locomotive and rail exports included the following:—

	Locomotives Nov., 1937	Locomotives Nov., 1936	Rails Nov., 1937	Rails Nov., 1936
	£	£	£	£
Argentina	6,634	3,094	6,157	2,614
Union of South Africa	—*	—*	16,488	60,603
British India	17,400	9,094	10,855	16,348

* Figures not available

Official Notices

London & North Eastern Railway Company

NOTICE IS HEREBY GIVEN that an Extraordinary General Meeting of the Proprietors of the London & North Eastern Railway Company will be held in the Board Room, Marylebone Station, London, N.W.1, on Friday, the 7th day of January, 1938, at 11.30 a.m., for the purpose of electing an Auditor of the Company in the place of Sir Albert W. Wyon, K.B.E., deceased.

Dated this 22nd day of December, 1937.

WILLIAM WHITELAW, Chairman.

JAMES McLAREN, Secretary.

Marylebone Station, London, N.W.1

In view of Christmas, this issue is being published three days earlier than usual, and consequently the traffic tables are omitted

Diesel Railway Traction

Fast Interurban Working

HOW exceedingly profitable and practical diesel trains can be on fast interurban business services over medium distances is shown by the constant extension of such trains on the Belgian National Railways, a system which has the so-called "coal problem" no less than any English line. Beginning in a modest way in 1934 with three 60 m.p.h. trips a day each way between Brussels and Ghent, 32·4 miles, successive stages have been the increase in the Ghent services, still operated by a 410 b.h.p. twin-car diesel-electric train at an all-in cost of about 9d. a mile; the inauguration of a 54 m.p.h. service from the Belgium capital to Charleroi, 38 miles (3 times a day in each direction); a 54 m.p.h. to Liége, 61·7 miles (2 times a day); a 54 m.p.h. service to Mons, 4 miles (2 times a day); and by the decision to inaugurate in February next a one-hour non-stop journey between Brussels and Ostend, 70·8 miles, with two up and two down trains a day. But an extension equal in magnitude to all these journeys put together is to be made, and to that end six 1,200 b.h.p. three-car and twelve 760 b.h.p. twin-car streamlined rakes have been ordered. The configuration of Belgium has resulted in all the principal lines, except those from Brussels to Antwerp (now electrified) and from Brussels to Ostend, being of extreme difficulty as to grades and service slacks, and despite great experience with steam-worked *train bloc* of limited formation, Belgian railway officers realised that only by the adoption of oil-engined sets could the existing schedules be accelerated to, and the punctuality maintained at, the standards desired by the travelling public. The problem in Belgium was not greatly different from that found in any large western European country, but one can imagine the surprise of a Manchester business man when on opening his newspaper he found that he was to be given convenient 55 to 60 m.p.h. services to Leeds, and Sheffield, and Liverpool, lines no more difficult as to grades and junctions or more densely occupied than some of the Belgian routes.

Diesels and Efficiency

IT would be unreasonable to expect a railway personnel to be more impartial or free from prejudice than those in other walks of life, and the scarcely concealed delight with which what was called the "withdrawal" of the German Flying Hamburger trains was hailed by certain administrators of transport in this country—and others—was a sharp pointer to the fact that existing interests, and not necessarily the most efficient and economical means, are apt to be the criteria by which proposed improvements must be judged nowadays. The railways are of course not alone in such an outlook; indeed, the public is not allowed to have, nor does it insist on having, the benefit of inventions or improvements unless that energy—whether in the form of natural fuel or sheer labour—which it is the true, though unacknowledged, aim of man to conserve, is used to the full. But such views are of particular importance to the railway world at the moment. By five years of continuous effort the traffic lost to the road has been gradually won back; but road interests are by no means sitting still, and a rigid adherence to old principles and methods will mean simply that in the next trade depression the railways will again be the first to suffer; whereas by energetically anticipating the requirements of the public for frequent, fast, and cheap travel any slump could be met with a good deal of confidence. A recently-retired C.M.E. has just said that for light self-contained units and light trains the high-speed diesel is in a class by itself, and that light diesel-driven units offer railways a means of giving cheap and frequent services where previously it did not pay to run steam trains. The truth of this is so evident that it needs no further emphasis, but what does require underlining is that there are hundreds of services in this country which could here and now be worked far more profitably by oil-engined railcars, and which render it quite beside the point to concentrate attention and discussion on other services on which diesel railcars might or might not pay.

Railcar Practice in Germany

UNDER the Reichsbahn railcar chief, Herr Direktor Stroebe, diesel traction developments have gone ahead steadily in Germany, not only in magnitude of numbers but in that wide field of experiment which is so necessary when large scale applications are in vogue. Even this field has been increased by the necessity for the Reichsbahn to sponsor German industries as far as possible. It is for this last reason that such a variety of engine types is found. The present programme comprises three or four car trains for fast main line services varying in power from 900 to 1,350 b.h.p.; double-bogie cars of 200 to 600 b.h.p., and twin-car non-articulated sets with two 275 b.h.p. horizontal engines and often hauling a trailer, for main line and important secondary line services where the speed does not exceed 68 m.p.h.; and two-axle cars with a 180 b.h.p. horizontal engine and a top speed of 45 m.p.h. The adoption of the horizontal engine has been a most important step; not only has it enabled the carrying capacity of both four-wheeled and bogie cars to be increased for a given weight, but the use of engines standard as to fixings, auxiliaries, and certain main parts, has enabled orders to be distributed over four manufacturers, thus complying with German industrial requirements without involving the Reichsbahn organisation in much extra trouble in maintenance and repair. In all three classes of traffic, viz., fast main line, slower main line and principal secondary, and branch line, a system of standardisation has been worked out whereby the construction of the mechanical portion is virtually independent of the engine make and the type of transmission. Supercharging on the Büchi system is now an acknowledged adjunct for the more powerful vehicles, *e.g.*, 560 b.h.p. single-unit cars and 1,200 b.h.p. trains, and other engine developments are the use of indigent lignite tar oil and the adaptation of the Daimler Benz airship engine to suit railway requirements. Although electric transmission hitherto has been used for all high-power units except two 1,200 b.h.p. trains and one 1,400 b.h.p. locomotive, the Reichsbahn has for some time been concentrating on the perfecting of hydraulic transmissions of the Voith and Trilok types to suit engine powers of 150, 200-210, 400-420 and 560-600 b.h.p., that is, covering the whole range of vehicles other than main line locomotives, and orders for 145 sets have been placed.

SUPERCHARGED RAILCARS FOR THE SOUTH OF FRANCE

Unusual mechanical and transmission features in P.L.M. railcars carrying over 100 passengers

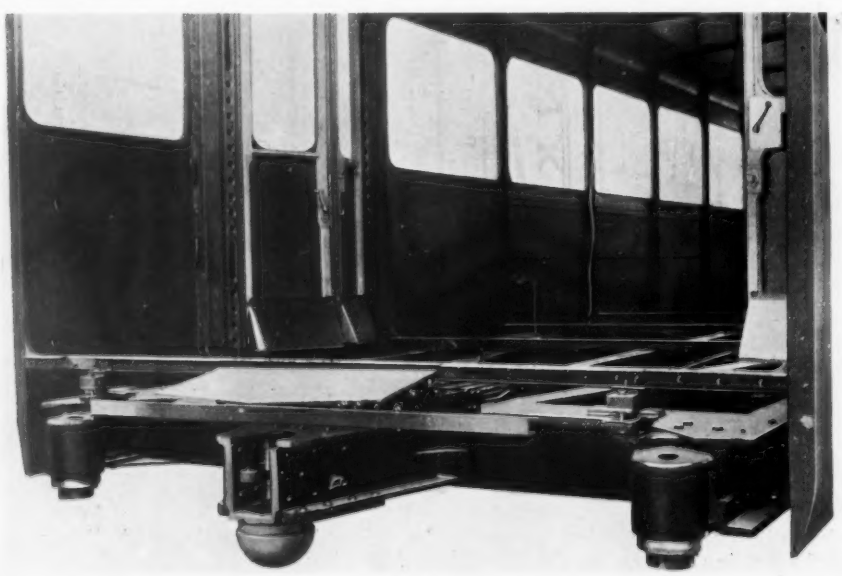
One of the eleven 350 b.h.p. diesel-mechanical standard-gauge cars

SEVERAL years ago the P.L.M. Railway and the French State Railways put into service some small six-wheeled Somua diesel railcars, the P.L.M. vehicles being four-wheeled and those of the Etat having six wheels in an arrangement embodying a novel form of articulation, in which one half of the vehicle had one axle at the front, the hind end being pivoted on to the other half, which had two axles. During the current year eleven larger vehicles of the Etat pattern have been delivered by Somua to the P.L.M.; the same type of articulation has been used, but owing to the larger size the shorter, or power, half of the complete car has two axles, and beneath the passenger portion there are three, the two outer axles being in a bogie as shown on the accompanying diagram. The new cars are stationed at the railcar centre at Avignon and work from there to Montpelier, Nimes, Le Teil, Marseilles, Aix and Toulon, covering a total of about 37,000 miles a month including vehicles in reserve or any under repair.

By the incorporation of the engine room and baggage compartment in what is to all intents a separate vehicle, noise, smell, and vibration are kept away from the passenger saloon, and the power and transmission equipment is arranged in more accessible positions. Further, for a given seating and luggage capacity—in this case 77 seats and about 90 sq. ft. of luggage or parcels space (plus 10 rush hour seats)—it is possible to obtain better riding on curves than with a single vehicle. This accommodation, including 16 seats which can be used either as first or second class, is obtained on a tare weight of something over 40 tons; in conjunction with the 350 b.h.p. engine this gives 8·5 b.h.p. per ton of tare, 7 b.h.p. per ton of gross weight, and 4 b.h.p. per seat on the basis of the 87 seats of all types. In accordance with the usual French practice, room for 20 persons standing is assumed in the entrance vestibules, and experiences we have had on railcars engaged in stopping services on main and secondary lines show that this is no idle assumption.

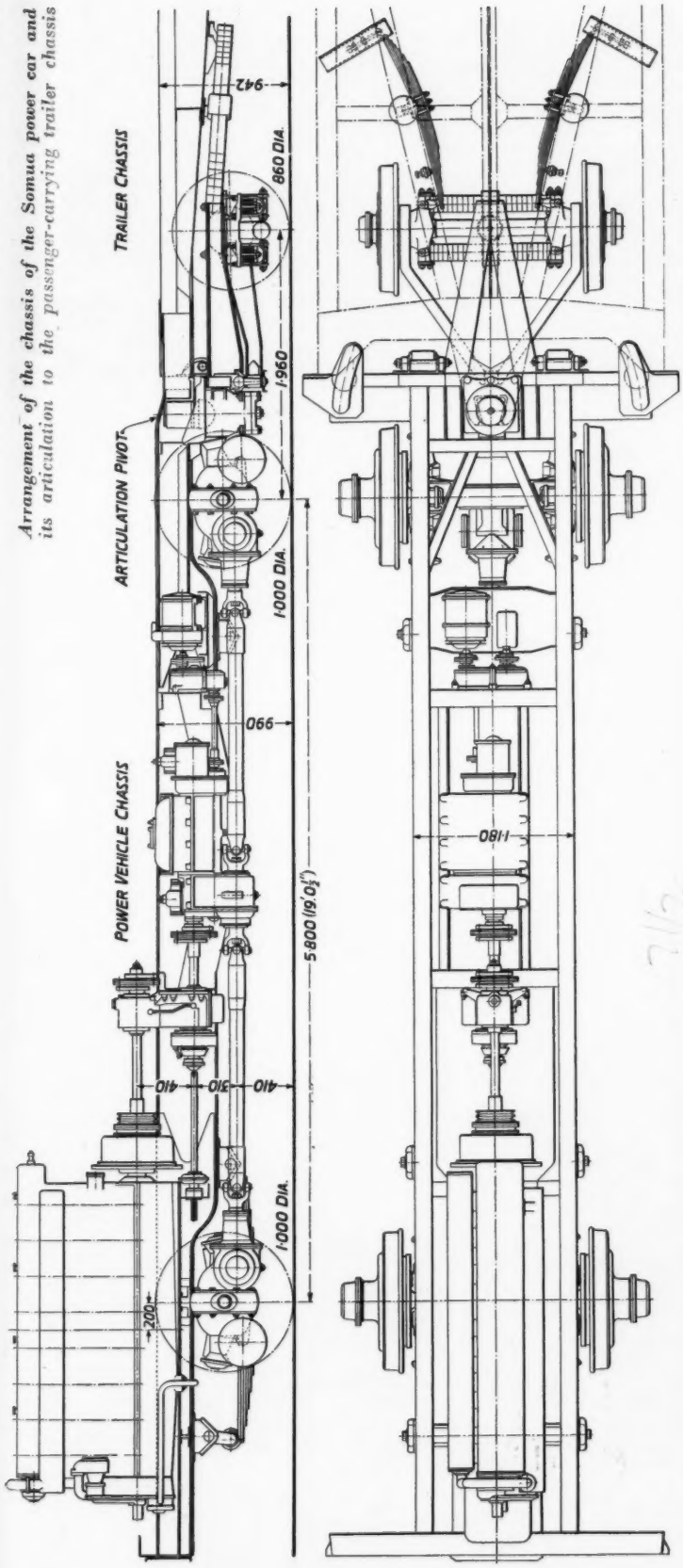
Articulation

Details of the articulation between the two parts of the vehicle are shown in the drawing on the opposite page. The power vehicle is carried on two fixed driving axles and on a Bissel truck which projects under the passenger portion of the car; this second portion is supported by the inner end of the power car underframe through a hemispherical centre pivot and flat curved side bearers, and, in effect, most of the weight of the inner end of



View of inner end of passenger-portion chassis, showing the articulation pivot and side bearers which rest on the power car. The underframe is of steel and the body framing and panels of aluminium alloy

Arrangement of the chassis of the Somua power car and its articulation to the passenger-carrying trailer chassis



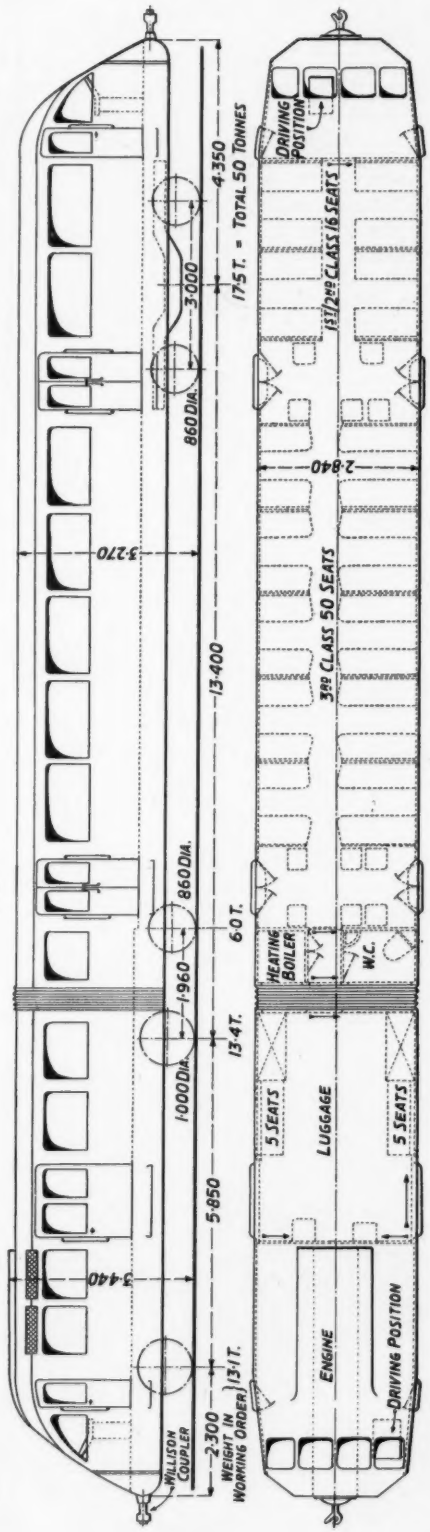


Diagram of 350 b.h.p. P.L.M. diesel-mechanical articulated railcar

the passenger car body is carried by the Bissel truck, although there is no direct weight-carrying connection. But the movement of the Bissel and the oscillations of the inner end of the passenger portion are controlled by almost horizontal laminated springs which at one end bear against the axleboxes of the Bissel and at the other against a simple dashpot on the underframe of the passenger portion; the buckle also is connected to the underframe of the passenger portion, by a cylindrical pin. The weight is transferred from the power vehicle to the Bissel through a rigid arm resting on top of the transverse laminated springs of the truck, but the radial arms of the truck are below this and are pivoted to the power-car end of the rigid arm through a ball and socket joint. The two sets of rollers which in the plan view can be seen on the headstocks of the power car take the rear ends of the laminated axlebox springs of that car.

Chassis and Body

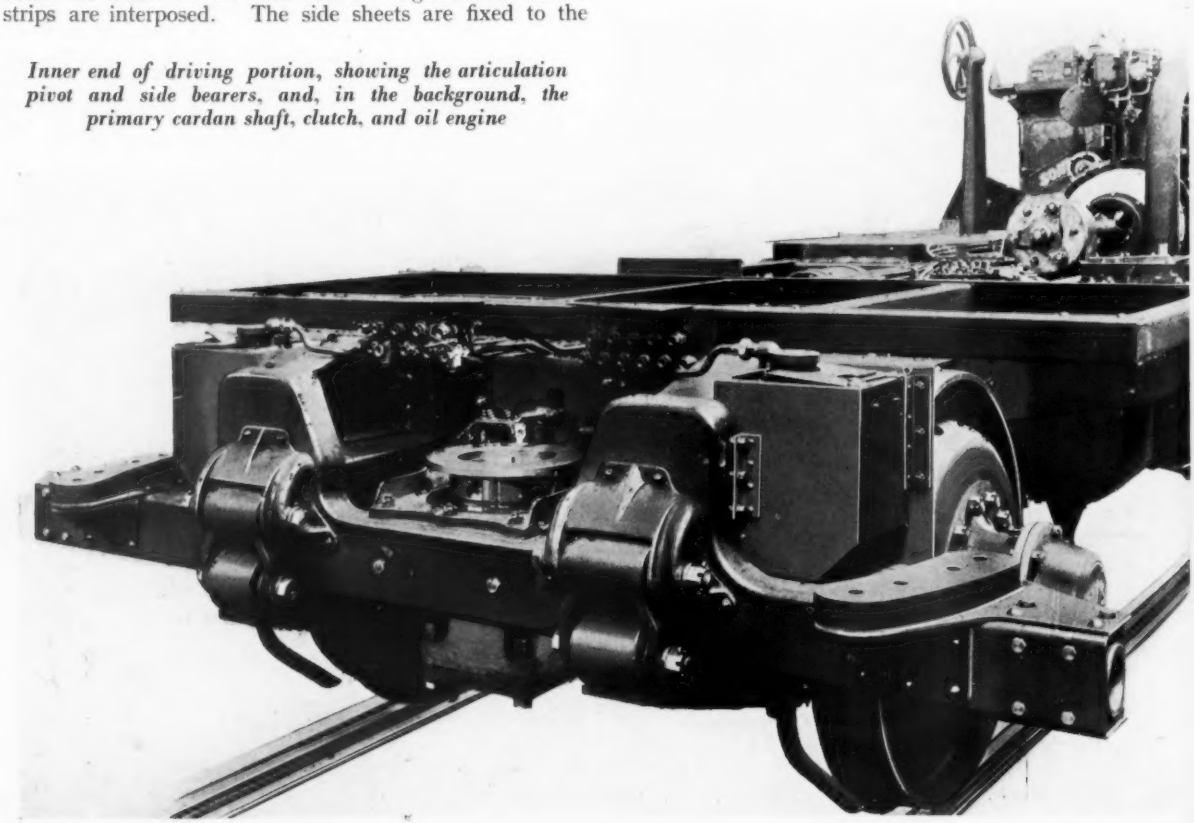
All the wheels of the railcar, whether driving or carrying are of monobloc construction of nickel-chrome-molybdenum steel; the driving wheels are 39·3 in. in diameter and the carrying wheels 34 in. The carrying bogie beneath the outer end of the passenger saloon is of an ordinary type with frames of steel plate and with a spring-mounted pivot and side bearers on the centre transom. The underframe portions of both the power and passenger cars are of channel sections, plates, and angles, well braced transversely and diagonally.

Aluminium alloy is used for the side, end and roof plates and framing, which are built up on the Million-Guiet system. Where the plates lap over each other a strip of compressible material is interposed to take up vibration and prevent noise. The body framing is carried on light steel transverse members at floor level, and where these are fixed to the underframe longitudinals rubber strips are interposed. The side sheets are fixed to the transverse members by gussets of steel plate, and there is a thin board of insulation material between them and the aluminium. The interior of the passenger saloon sides is lined in a Rexine type of material banded by an aluminium strip along the bottom, and in the baggage compartment an inner panel plate of steel is taken from the floor to the waist rail. The large mouldings at the cant rail which separate the side panels and the plates of the double roof are used to house the electric cables. The floor is covered in linoleum with a rubber carpet above; poplar wood is used for the flooring of the baggage compartment, which has a number of trap-doors for the inspection of the transmission. All the windows are of safety glass, and those in the passenger saloons can be opened and are fitted with a balancing mechanism. Ventilation is assured by four Fessler ventilators, three in the passenger saloon and one in the baggage compartment, and the heating is effected through hot water radiators in the saloon, baggage compartment, and driving cabins, fed by an anthracite-burning stove located by the vestibule connection between the two cars. Other fittings include light aluminium-plate parcels racks mounted on Alpax brackets, mirrors on the cross partitions, and a lavatory. The lighting is electric and the circuits, and those for engine starting, are fed by a nickel-cadmium battery of 24 volts, 318 amp. hr. capacity.

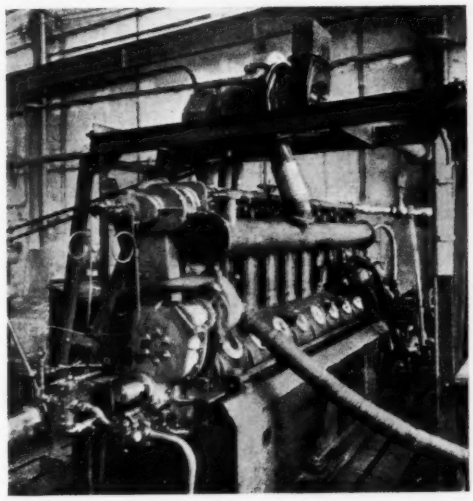
Engine

The engine is of the M.A.N. four-stroke type built by the Soc. Générale de Constructions Mécaniques. Originally it was intended that six cars should have supercharged engines, but the whole 11 now are so fitted, and also two spare engines which were included in the order. The basic engine is a unit with six 175 mm. by 180 mm.

Inner end of driving portion, showing the articulation pivot and side bearers, and, in the background, the primary cardan shaft, clutch, and oil engine



cylinders developing 280 b.h.p. at 1,400 r.p.m. on a weight of 4,200 lb., but with the Rateau turbo-blower in operation the engine is set to give 350 b.h.p. at 1,500 r.p.m., and by the incorporation of a welded steel crankcase and cylinder block, the weight has been kept down to 4,370 lb., giving a unit weight of 11·4 lb. per b.h.p. against the top output of 385 b.h.p. The nominal pressure produced by the exhaust-gas turbo-blower is 1½ lb. per sq. in., and only 17 per cent. of the increment in the normal output is obtained from the supercharger, the remainder being due to the increase of 100 r.p.m. in the speed. The only modification of any importance to the standard engine is the provision of a new camshaft. Cooling of the water and oil is effected in a gilled tube radiator located in the roof, which is itself cooled by the natural draught of motion. Any risk of freezing in cold weather is eliminated by an automatic draining of the tubes when the engine—and thus its pump—is stopped. An engine-driven air compressor supplies the air necessary for the controls and the brakes, but a second compressor, driven from the transmission, is fitted in order to supply any air required when coasting down long grades. The engine is mounted rigidly on the chassis structure and can be taken out through the front of the car, where there is a removable panel.

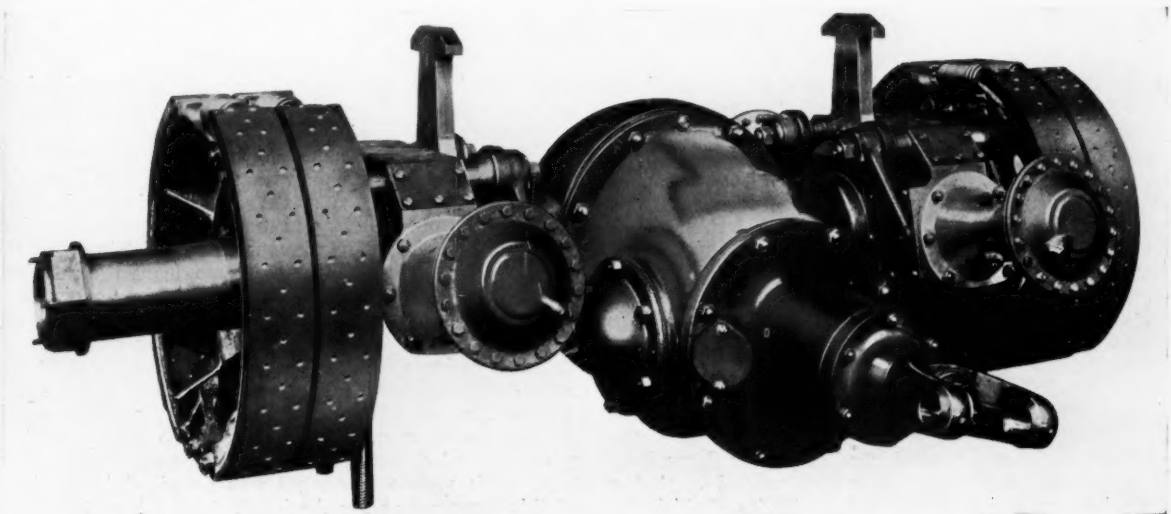


350 *b.h.p. supercharged S.G.C.M. engine*

Transmission and Controls

Immediately behind the engine is an automatic clutch of the Fieux type, comprising first a slipping device with friction taking place between the inside of a drum and the outer face of a flat coiled spring, and secondly a coupler with heavily-loaded friction faces, which are not required to slip. Easy gear-changing is possible, owing to the small inertia of the coupler, and the slipping being taken up by another constituent. From this clutch the drive is led to a step-up gear drive which increases the rotational speed due to the engine shaft, and thus makes the gearbox smaller. The gearbox is in the same casing as the reversing gears and a freewheel, and gives five speeds in each direction, 12½, 21½, 32, 42, and 53 m.p.h. at 1,500 r.p.m. engine speed. All the gear operations are carried out by air cylinders, working at a pressure of 85-95 lb. per sq. in. From the freewheel unit cardan shafts lead forwards and backwards to the two axles supporting the power car. Although these axles are each in one piece, a modified form of road practice has been followed by making the wheels loose and rotating on roller bearings, and therefore it is the wheels and not the axles which are driven from the final ends of the cardan shafts. The brake drums are applied by compressed air, with the addition of hand-applied linkage on the two axles of the power car.

Each driving cabin contains handles for starting the engine and regulating the fuel injection, clutching and de-clutching pedals, reverser, three handles for speed-changing, air brake and air sanding valves, hand brake screw, a pneumatic valve for locking the freewheel, and a switch for cutting out the driving position not in use. In addition there are the usual air pressure gauges, thermometers giving the temperatures of the cooling water, oil, and exhaust gases, oil pressure gauge, speed indicator, and auxiliary electric meters. At each end of the car is a Willison automatic coupler, but this is used only in case of a failure when the car must be hauled.



Driving axle assembly of Somua railcar showing drive from gearbox and brake drums. The wheels are loose on the axle and run in roller bearings on the journals outside the brake drums. The springs bear on the flat surface between the brake drums and the short vertical levers

DIESEL LOCOMOTIVES FOR THE SOUTHERN

Heavy and robust design for yard service in London area

THREE oil-electric shunting locomotives have been put into shunting service at Norwood yard on the Southern Railway, where they are engaged in 24-hr. service for six days a week, leaving Norwood Junction sheds at 6.0 a.m. on Mondays and returning about 6.0 a.m. on Sundays; the fuel tanks are of a capacity sufficient for these duties to be performed without replenishment. The locomotives are of the English Electric type as used so successfully on the L.M.S.R. and G.W.R., but in this case the three mechanical portions were built at the Ashford works of the Southern, and were sent to the Preston works of the English Electric Co. Ltd. for the installation of the engine and transmission equipment.

Although to the same general design as the L.M.S.R. locomotives, which were described in detail in the issue of this Supplement for April 17, 1936, the Southern locomotives have an overall length 1 ft. 9 in. greater—30 ft. 3¼ in.—and weigh 55¼ tons in full working order contrasted with 51 tons; the maximum tractive effort, 30,000 lb., is the same, but the wheels are 4 ft. 6 in. in diameter in place of 4 ft. 0½ in. Southern Railway standard parts are used for such details as the axleboxes, springs, and brake gear. The one-inch outside main frame plates are stayed with drag boxes and intermediate stretchers of steel plate; the three supports for the engine-generator pedestals are steel castings secured to the locomotive frame structure, and rubber pads are inserted between the brackets and the pedestal. Westinghouse brake equipment, with a self-lapping valve having a handle on each side of the cab, applies a single block on each wheel. Over the engine is a steel bonnet with hinged inspection doors down each side, and at the sides are two welded steel fuel tanks with a capacity of 195 gal. each, from which the fuel is led to a 100 gal. service tank in the cab roof before being passed to the engine.

Power is provided by an English Electric 6K type engine developing 350 b.h.p. at 680 r.p.m., the brake m.e.p. then being 72 lb. per sq. in. and the piston speed 1,370 ft. per min. The cylinders have a bore and stroke of 10 in. by 12 in., and the fuel is injected by a C.A.V.-Bosch fuel pump through centrally-placed multi-hole nozzles of the same manufacture. As befits an engine suitable for shunting work, the weight has not been unduly pared down, and the complete engine-generator set, including the overhung auxiliary generator, weighs over 12 tons. The exhaust gases are taken through a water-cooled manifold before being led to the silencer, which is located behind the radiator. Cooling of the engine circulating water is effected in a Serck sectional radiator, two elements of which are used to cool the engine lubricating oil. A motor-driven fan with thermostatic control by oil and water temperatures is used to provide cooling air for the radiators, and the water circulation is maintained by a centrifugal pump chain-driven from the main shaft of the engine.

The latest British standard gauge diesel-electric locomotive

The direct-coupled main generator is a self ventilated separately-excited machine with six poles and interpoles and six brush arms. A starting winding is provided for motoring from a battery in order to start the engine. The generator has a continuous rating of 360 volts 450 amp. at 680 r.p.m., and at the same speed the auxiliary generator, which is overhung from the main machine, has a continuous output of 11 kW. at 100 volts. The auxiliary generator is used to give battery charging over the full range of engine speed, and it also supplies current for the control, lighting, and compressor motor. The control is on the English Electric torque system, and the small voltage generator used is mounted on top of the auxiliary generator and driven from the shaft of that machine by a belt. This system of control was described in the issue of this Supplement for April 17, 1936. The two nose-suspended traction motors are outward hung from the end axles, and this forms a difference with the L.M.S.R. engines, in which both motors are backward hung. Each motor has a one-hour rating of 375 amp. at 500 volts

and a continuous rating of 220 amp. at 500 volts; the axles are driven by spur gears with a ratio of 4·43 : 1.

As the locomotives are operated by one man, all controls in the cab are duplicated to enable him to drive from either side. A dummy controller on one side is coupled mechanically to the master controller on the other side; the two deadman pedals are also coupled in the same way. Delayed action apparatus allows the driver time to pass from one side of the cab to the other before the emergency brake is applied. Six power notches are provided on the master controller, the first five giving varying engine outputs with the traction motors coupled in series, and the last notch giving full power with the motors in parallel. By stepping the controller back from the last notch, the parallel coupling of the motors is maintained at intermediate engine speeds until the off position is reached, this feature being similar to that incorporated in the L.M.S.R. locomotives.

Specifications for Locomotive Oil Engines and Auxiliaries

Recent work in America

AMONGST the work done recently by the Railway Automotive Equipment Committee of the American Association of Railway Electrical Engineers has been the building up of specifications for diesel-electric locomotives and trains, and this is supplementary to requirements of the Interstate Commerce Commission and the National Board of Fire Underwriters.

The section on engines and auxiliaries has been drawn up to suit either four-stroke or two-stroke power units, and stipulates the injection shall be of the airless type controlled by an individual fuel pump for each cylinder, and that the injection system be so arranged that the fuel supply to any cylinder may be cut off without interfering with that to the remaining cylinders. The engines must operate continuously without noticeable continuous smoke, excessive noise, or vibration at all speeds and loads up to their full rated capacity and must be free from objectional smoke, noise, or vibration while operating at their full designed overload capacity; they must be so designed and constructed that they will operate satisfactorily in the service specified, without removal of heads, liners or pistons more frequently than once every twelve months or every 100,000 miles. Engines and engine generator sets must be free from harmful critical speeds from 10 per cent. below idling to 10 per cent. above maximum operating speed.

Arrangements must be made to start the engines from each operating position or from a position adjacent to the engine, and to shut down the engines from each operating position and at the engine. Starting must be accomplished by using the generator as a starting motor, or by means of an auxiliary motor; power for starting to be taken from battery. Suitable terminals must be provided to enable connection to be readily made to an outside source of power for emergency starting in case of a dead battery. Stopping the engines must be accomplished by means other than a valve in the fuel oil supply line.

The governor must be able to maintain the engine speed within one per cent. plus or minus for any given throttle position from the maximum to the minimum load obtainable. With any change in engine throttle position, the momentary speed must not be greater than 7 per cent. above the speed corresponding to the higher position nor less than 10 per cent. below the speed corresponding to the lower position. Provision must be made to insure a full supply of fuel oil being delivered to injection nozzles, immediately upon starting the engine.

Cylinder heads, having valves, must be equipped with renewable valve seats or have ample provision for reseating. Valves must be of heat-resisting alloy steel and of one piece construction. Valve push rods and rocker arms must be totally enclosed and pressure lubricated.

The cylinders have to be equipped with separate liners, free to expand longitudinally at the lower end and sealed to prevent leakage of cooling water. Seal rings of oil-resisting material are recommended. Main and crankpin bearings must be accessible for inspection and easily removed, and breather pipes must be provided with separators or fine screens.

Lubricating Systems

The lubricating oil system must be self-contained and automatic, with the oil pump mechanically driven from the engine and of sufficient capacity to maintain normal operating pressure with oil at its maximum operating temperature and with the engine clearances increased by wear to their maximum recommended limit. Provision for convenient filling, and for draining the entire cooling system from a single point, and for draining the entire lubricating oil system from a single point is stipulated. Lubricating oil passages in the engine must be of ample size to permit starting in cold weather without building up excessive pressure in the system. The lubricating oil pressure relief valve is to be mounted outside of the crankcase and so arranged that adjustments may be made with the engine running. Lubricating oil pumps are to be mechanically driven from the engine.

Provision has to be made for convenient application of hand tachometer on the engine crankshaft or on an extension of the shaft. Thermocouples for pyrometer connection must be installed in each cylinder exhaust passage, and a pyrometer installed at each engine on road locomotives. On each cylinder there must be cocks for the application of cylinder pressure indicators. All piping on the engine and between the engine and auxiliaries is to be arranged to facilitate removal and replacement of parts.

A device not connected with the engine governor must be installed to automatically stop the engine in the event of overspeeding; this device must be of the manually reset type. A pressure switch must be provided for stopping the engine, by means other than shutting off the fuel supply, when lubricating oil pressure drops below a safe value, and provision must be made for limiting the quantity of fuel oil injected in order to prevent overloading the engine. Crankcase cover plates must be equipped with ample blow-out patches or safety plates.

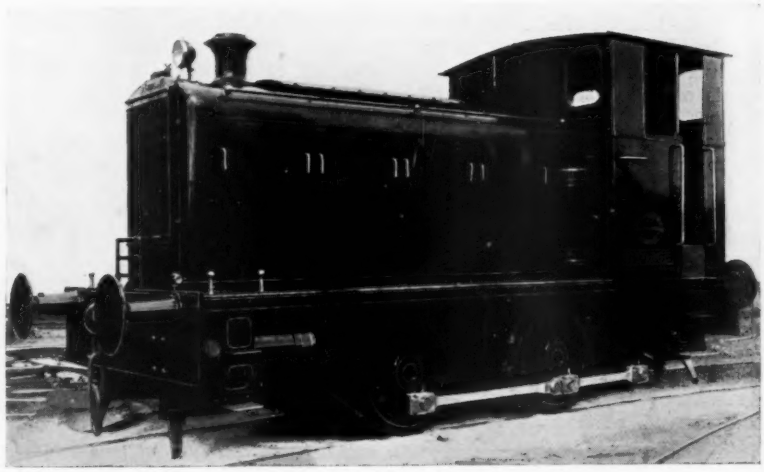
An engine cooling system of sufficient capacity to permit continuous engine operation at full load with 100 deg. F. outside air, must be provided. If possible, radiators should be self-draining into a tank on the inside of the cab; if the radiators cannot be made self-draining, they must be equipped with shutters that can be operated from the operator's compartment. Radiator design must allow for the easy removal of any single section for repairs or replacement. Radiator fans preferably to be motor-

driven and arranged for two-speed operation. If mechanically driven from the engine they must be connected by magnetic clutches so that they can be shut down with engine running. One or more electrically-driven air compressors must be furnished, the capacity of which must be approved by the railroad. Compressors are to be arranged so that they will operate at normal speed, regardless of the speed of the main oil engine. A suitable automatic electric governor must be furnished to start and stop the compressors at predetermined pressures.

Motor-driven fuel transfer pumps shall be provided. Fuel tanks must be equipped with a sump well of a capacity not less than 0·1 per cent. of the tank's capacity, for the collection of water and sludge. All fuel, lubricating oil and water tanks must be provided with hand holes for cleaning, and approved connections for fuel and water filling fitted on the outside of the cab or bonnet; filling pipes must discharge into the tops of the tanks. Sump wells must be deep enough to prevent the agitation back into circulation of water and sludge, and must be provided with suitable drain plugs. Lubricating oil filters are essential and must be of a capacity sufficient to filter all the oil circulated by the engine pump.

Silencers must be provided for the exhaust gases, and the intake air must be filtered before admission to the engine. With power units of over 900 b.h.p. the intake air must be taken from outside the cab and suitable intake silencers provided. Means for keeping the engine warm during lay-over periods must be incorporated, and provision must be made for draining from the vehicle all oil leakage from engine, tanks, pipes and filters, but the arrangement must be such that any leakage is not discharged on to the traction motors or other equipment beneath the underframe.

Diesel Locomotives for Government Service



150 *b.h.p. standard gauge shunter*

THE War Office has lately taken delivery of two diesel-mechanical locomotives built by Andrew Barclay, Sons & Co. Ltd., of Kilmarnock. They are of the 0-4-0 type, and are intended for shunting duties and for use on sharp curves and indifferent track. Occasionally they will make fairly long runs, and for this reason they have a larger range of speed than is usual in locomotives of this type.

A four-stroke six-cylinder L3 type Gardner engine forms the power unit, and develops 150 b.h.p. at 1,200 r.p.m. The drive is taken through a traction-type Vulcan-Sinclair hydraulic coupling mounted on the engine flywheel and through a flexible coupling to a four-speed Wilson epicyclic gearbox giving track speeds of 4·4, 7·7, 12·0 and 18·0 m.p.h. with the engine running at 1,200 r.p.m. This gearbox is mounted above a reverse and final drive gearbox of Bostock & Bramley make, which is itself bolted direct to the locomotive frames and carries the jackshaft in roller bearings; indeed, all the bearings in the transmission up to the jackshaft are of the ball or roller type. The final drive on to the jackshaft is of the enveloping worm type, and from the jackshaft the torque is transmitted to the wheels by cranks and rods with adjustable bearings. The Wilson gearbox is operated by compressed air at a pressure of 60 lb. per sq. in. obtained from the brake supply through a reducing valve. For the operation of the gears only one lever is required, but for convenience in driving a lever has been put at each side of the footplate. The combination of the Vulcan-Sinclair fluid coupling and the band brake clutches in the Wilson gearbox provides easy gear changing and shockless drive. The engine speed is controlled by a throttle handle operating on the governor, but there is a separate control for stopping the engine. Electric engine-starting is provided, and the batteries are used also to supply current for the head, tail, and cab lamps. In the bonnet behind the engine is a 100 gal. fuel tank, which normally is sufficient for several days' work. The engine circulating water and lubricating oil are cooled in a Reliance radiator at the front of the locomotive.

Westinghouse straight air brakes apply blocks on all wheels and the air is supplied by duplicate compressors driven through endless belts from a prolongation of the engine crankshaft. To give precise control, a Westinghouse self-lapping driver's brake valve is fitted, and has a handle on each side of the cab. A hand screw brake is incorporated also. Oil box lubrication is used for the axlebox and coupling rod bearings, but all the other bearings in the mechanical portion have nipples for grease-gun lubrication. Hand sanding is applied to the outer sides of all wheels. On the lowest gear step the tractive effort is 9,800 lb., giving a factor of adhesion of 4·8 against the full working order weight of 21 tons; on the top gear step the tractive effort is 2,550 lb., and these figures indicate that full use is made of the engine power available.

RAILCAR ACCELERATION

By Dipl.-Ing. J. L. KOFFMAN

THE rapid advance of the diesel railcar has brought both designers and operators face to face with numerous problems which, although forming the subject of wide discussions along rather general lines, are sometimes not given sufficiently close attention to enable exact calculations of the necessary limits of their application and the resulting first costs and maintenance expenses to be based upon them. Among these problems the question of power transmission and power-weight ratio with high-speed railcars deserves serious consideration.

Mechanical transmission has forged ahead for use in engines developing up to 500 b.h.p. While a power-weight ratio of about 10 b.h.p. per ton is recommended for modern acceleration and maximum speed requirements, it is not always possible to obtain this ratio within the given weight and price limits. In order to determine the influence of power-weight ratio upon the operating characteristics of a high-speed railcar, performance curves were plotted from recent trials with an articulated vehicle on the Continent, and the results obtained are here applied to a similar vehicle for which different engines were available.

In design and appearance the car resembles the latest vehicles of the Flying Hamburger type and weighs 90 tons. Both the end bogies carry a power plant consisting of an engine and five-speed mechanical transmission driving both axles through bevel gears. An articulated bogie carries the inner ends of the two bodies. The wheels are of 2 ft. 11½ in. in diameter and owing to existing track conditions the maximum speed has been limited to 81 m.p.h. Five different types of engine were available for consideration, the main data concerning them being summarised in the accompanying table.

A Mylius pre-selective pneumatically operated transmission of the GW type (as fully described in our issue of July 9, 1937) is assumed, the gear ratios being 4·74, 2·66, 1·38, 1·342, and 1 to 1. An assumed total efficiency of power transmission from engine to axle of 94 per cent. was taken into account in preparing the curves, while a further allowance of 19, 4·5, and 2·5 b.h.p. per engine was made for the radiator fans, air compressor, and lighting dynamos respectively. The tractive effort required for the propulsion of the car has been calculated on the assumption that the frontal area of the car is 75·5 sq. ft.

Speed-Tractive Effort Characteristics

The speed-tractive effort shows that while any one of the five engines can maintain maximum speed on the level and up an incline of 1 in 200, leaving ample power for acceleration, only the Daimler (Mercedes) model provides sufficient power to negotiate a gradient twice as steep at almost maximum speed, while a speed of about 60 m.p.h. can be maintained in fourth gear on an incline of 1 in 50. The other four engines develop only about 43 m.p.h. in third gear over the same gradient. It is of interest to note that apart from the Maybach engine, the torque characteristics of the engines in question are comparatively constant and parallel to each other over the whole speed range. With the 410 b.h.p. Maybach engine the torque at low speed has the same value as the 475 b.h.p. Daimler power unit running at the same speed, but at full engine speed it drops by about 12 per cent., a desirable set of characteristics for starting up on heavy gradients. The speed-gradient performance curves also show that with the exception of the M.A.N. engines, none is able to drive the car over a gradient of 1 in 33·3 at a speed of 43 m.p.h. on the top of third gear, while on an incline of 1 in 25 (which is sometimes found on foreign lines) all but the 370 b.h.p. engines are able to maintain a speed of 30 m.p.h. or so in second gear.

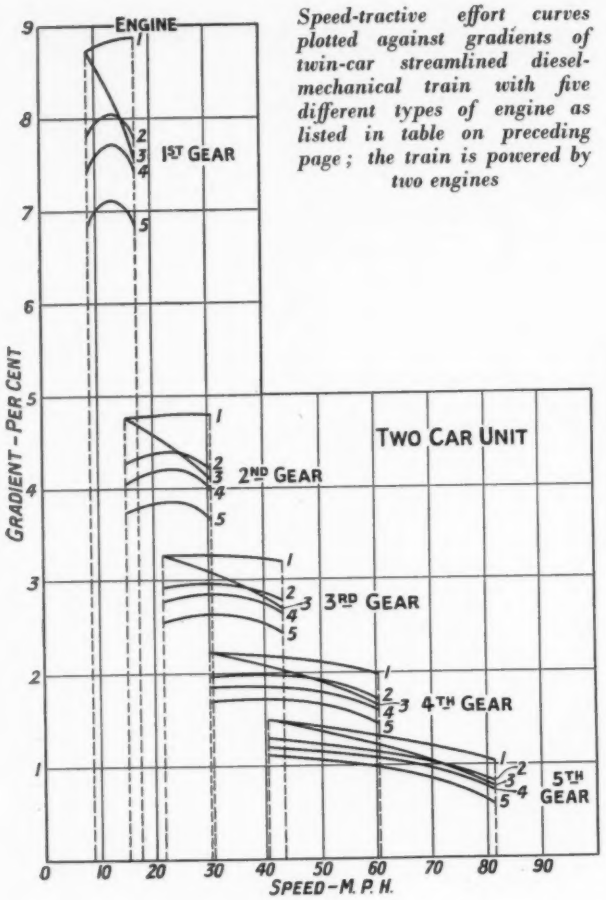
It is evident that while the power-weight ratio is not of such great importance for operation over level track, even a small incline of 1 in 100 makes a considerable difference. As may be seen on the gradient-speed diagram, full speed on such a gradient can be achieved only with two 475 b.h.p. engines, as against 72 m.p.h. for both 420 and 410 b.h.p. engines and round about 60 m.p.h. with the 370 b.h.p. units. When considering the type of engine to be employed the nature of the service for which they are destined is also of importance. Whereas both the 420 b.h.p. engines can attain maximum speed in 2 min. 33 sec., on level track, the 375 b.h.p. models require 3 min. 23 sec. Over a long-distance non-stop run of, say, 100 miles, covered at an average speed of 60 m.p.h., the difference in running time due to slower acceleration with the 370 b.h.p. engines would amount to only 0·6 per cent., rising to 9 per cent. for a service involving a stop every 10 miles. This can be made good by reducing the coasting time without perceptibly increasing gross fuel consumption due to the reduced consumption of the smaller engines. However, the possibilities offered of compensating for the lack of acceleration by running longer periods under power are limited by the type of service in question. It is of interest to note that, allowing 2 sec. lost per gear change, or 10 sec. for the five-speed gears, 7·2 and 4·9 per cent. in time is lost in acceleration with the 475 b.h.p. and 370 b.h.p. engines respectively, and here a transmission with a sustained drive would be of definite advantage.

Fuel costs being between 13 and 16 per cent. of the total operating expenditure (the average being about 15 per cent.), the 22·5 per cent. reduction in fuel consumption of the Ganz engine as compared with the M.A.N. unit permits a 3·4 per cent. reduction in operating costs with almost equal performance for long-distance service.

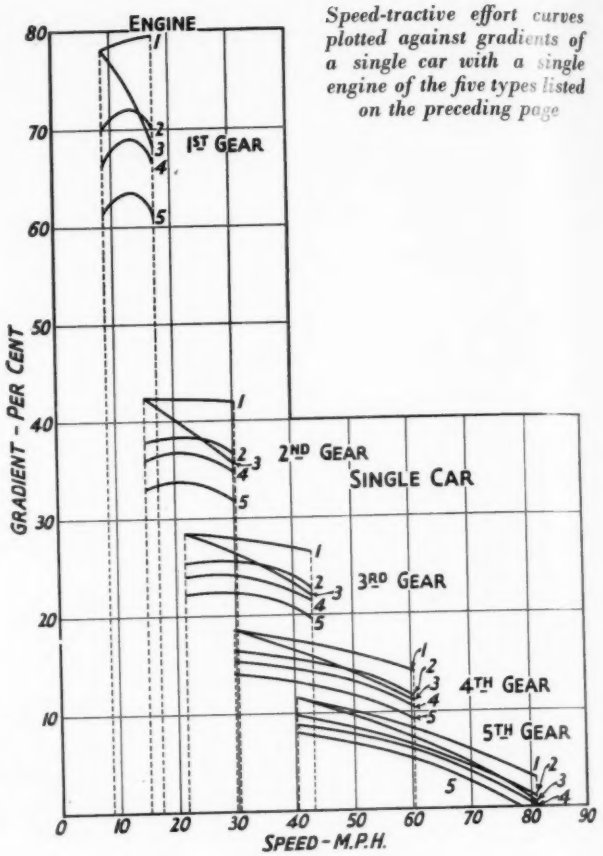
The influence of the available power output becomes far

ENGINE TYPES AVAILABLE

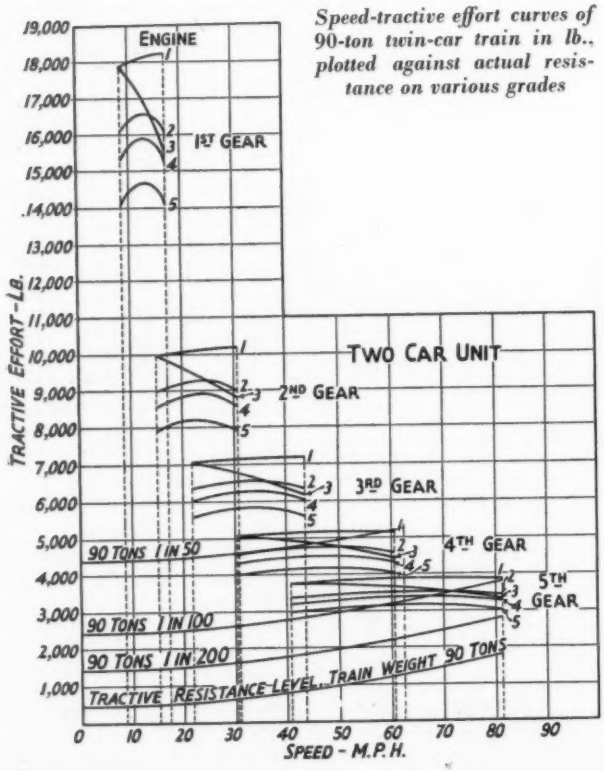
No.	Make	Type	H.P.	R.P.M.	Weight, lb.	No. of cyls.	Bore, mm.	Stroke, mm.	Fuel consumption at full load in lb. per b.h.p. hr.	Power/Weight Ratio h.p. per ton
1	Daimler-Benz OM86	Vee	475	1,400	5,250	16	165	195	210	10·5
2	M.A.N. 412V.	Vee	420	1,400	6,400	12	175	180	173	9·3
3	Maybach GO56	Vee	410	1,400	4,625	12	160	200	170	9·1
4	Paxman Comet MKIII ..	Vee	400	1,500	—	12	177·8	196·85	165	8·9
5	Ganz	Vertical	370	1,300	6,700	8	170	240	163	8·2



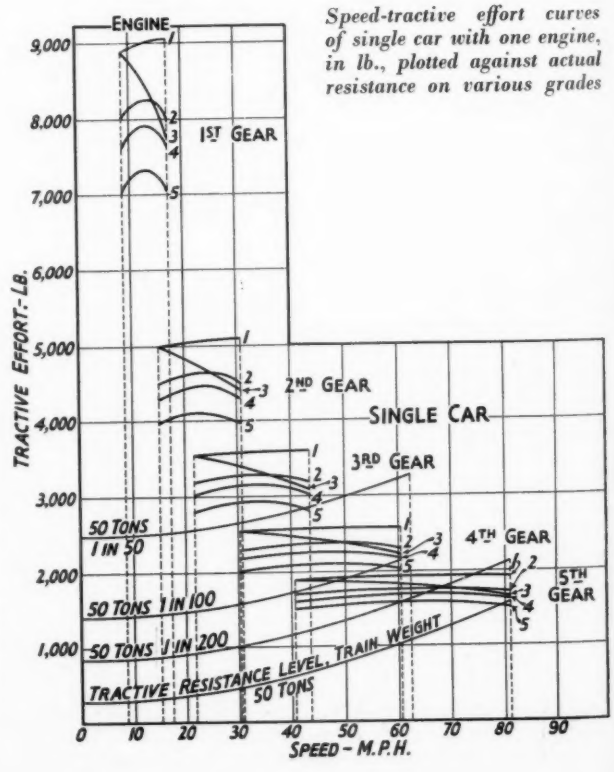
Speed-tractive effort curves plotted against gradients of twin-car streamlined diesel-mechanical train with five different types of engine as listed in table on preceding page; the train is powered by two engines



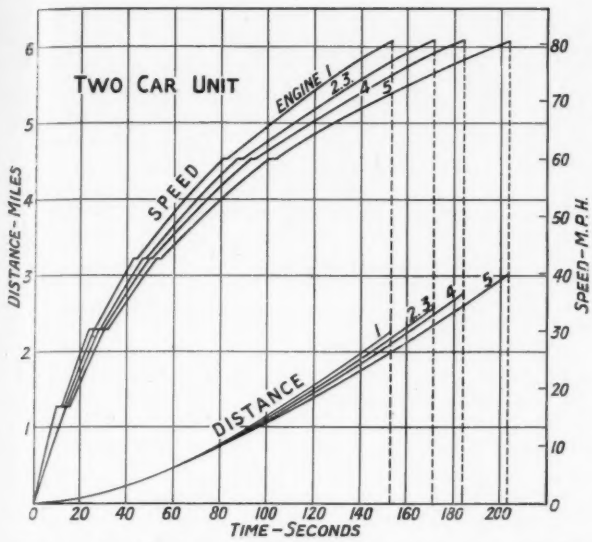
Speed-tractive effort curves plotted against gradients of a single car with a single engine of the five types listed on the preceding page



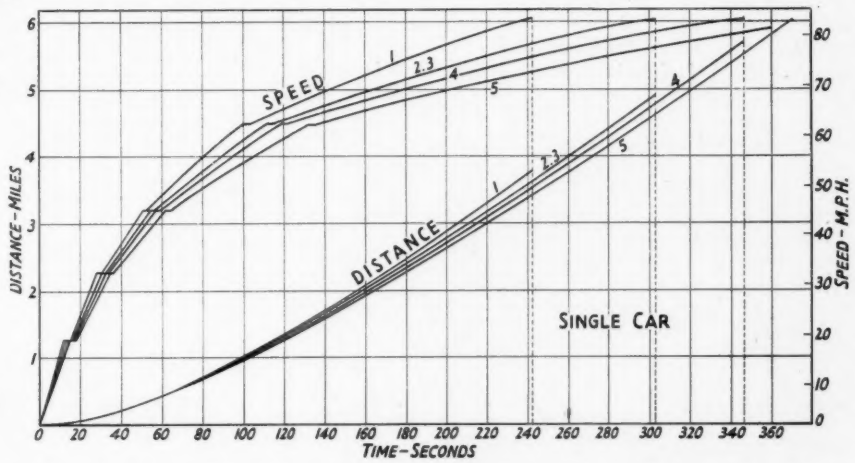
Speed-tractive effort curves of 90-ton twin-car train in lb., plotted against actual resistance on various grades



Speed-tractive effort curves of single car with one engine, in lb., plotted against actual resistance on various grades



Above: Acceleration curves on distance and time bases of twin-car diesel-mechanical train powered by two engines of the types listed in table



Right: Acceleration curves of single car with one engine of the types listed

of wheel and rail. Thus high values are shown with clean, dry rails, somewhat reduced values with wet rails, and a considerable reduction is noticeable in rainy or foggy weather. It is also known that adhesion is reduced when rolling is replaced by gliding, as when starting up on curves, in which case pure rolling cannot be achieved with both wheels fixed on a common axle. It is, however, not known whether the adhesion depends on the axle load or wheel diameter.

At present, dependable data on the value of the coefficient of adhesion are available for speeds up to 50 m.p.h., indicating that in starting on dry rails with efficient sanding, a value of 33 per cent. can be obtained as against 25 per cent. on wet rails, this value gradually diminishing to 18 per cent. and 12 per cent. at 50 m.p.h. This clearly indicates the necessity for increasing the adhesion weight by driving a greater number of axles, in order to ensure good accelerating qualities, especially when starting up on gradients.

The curves of car acceleration also show that while the increase of speed is similar with all engines in the lower gears, it is the performance above third gear that more pronounced with a single-engined vehicle, as is shown by curves plotted for a 50-ton unit powered by one of the engines considered with the articulated car, employing similar gear and allowing the same amount of power for auxiliary drives. At full car speed the tractive resistance on the level is increased from 19·5 lb. per ton, as with the articulated car, to 31·5 lb. per ton due to the influence of air resistance, which, with the same front surface becomes more pronounced per ton of weight with a light vehicle than with a heavy one. On this account the 370 b.h.p. engine is not in this case considered, as its maximum speed is limited to about 80 m.p.h. The 475 b.h.p. engine attains its maximum speed in 4 min. 2 sec., as against 5 min. 46 sec. for the 400 b.h.p. unit, the average rate of acceleration being 0·33 m.p.h.p.s. as compared with 0·23 m.p.h.p.s. respectively. The difference in performance is again not of great importance for long-distance non-stop service, but deserves careful consideration for short-distance service, especially when operation is over lines with frequent gradients, when an increase of engine power output from 400 to 475 b.h.p. would considerably improve the operation performance of the vehicle.

Besides being limited by the available power output the rate of acceleration is also limited by adhesion. It is well known that the coefficient of adhesion between wheel and rail is reduced with the increase of speed and that it depends to a considerable extent on the conditions is of paramount importance. A slight change in the slope of the curve results in considerable alteration in the time required for acceleration up to full speed. It is evident from this that ample power must be available not only for quick acceleration in starting but also at higher speeds, in order to attain maximum speed. This is particularly so when frequent slacks are made due to existing track conditions, thus improving the car performance. The importance of this point was not recognised until comparatively recently.

It is to be hoped that the foregoing remarks will give an idea of the value of comparative railcar performance curves in clearing up most of the basic problems involved when considering the effects gained from railcar operation over certain routes. It is also to be hoped that similar curves will be prepared in future for the benefit of both manufacturers and operators who are contemplating the introduction of railcars, as the question of first cost and maintenance expenses is also involved.

VULCAN-SINCLAIR COUPLINGS FOR BELGIUM.—The 12 twin-car trains and 6 single-unit railcars with Carels-Ganz engines and S.L.M.-Winterthur gearboxes are all to be fitted with Vulcan-Sinclair hydraulic couplings, and the order for 30 units has been placed with the Hydraulic Coupling & Engineering Co. Ltd.

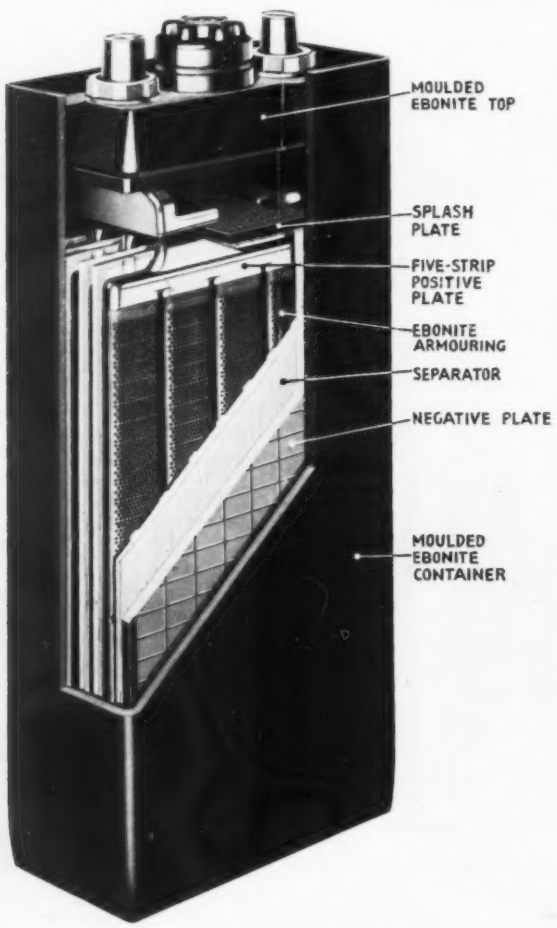
AN IMPROVED FORM OF RAILCAR BATTERY

IN not a few railcars the heavy duties required from the battery have led to a short life of the plates and a relatively considerable expense in upkeep, more particularly in lead acid batteries, and the vibration present in railway vehicles has not tended to help matters. With the specific object of greatly increasing the life of the lead-type of battery installed in railway and heavy road vehicles, new principles of construction have been adopted in the C.A.V. armoured plate battery manufactured at the C.A.V. works in Formans Road, Birmingham, and marketed by C.A.V.-Bosch Limited, of Acton. Experience over a period of two years in heavy road service has indicated that the life will be lengthened to about twice that of a normal lead battery.

The problem of the positive plates, from which comes about 80 per cent. of the sediment, has been tackled in thorough fashion. Although the antimonial lead grid still forms the backbone of the plate, its structural design has been altered completely in order to eliminate the distortion and diagonal buckling of the single-piece grid, and is now formed of five independent strips secured to common top and bottom bars. Each of these strips, by flexing separately, is free to take up the forces of distortion imposed upon it alone, and as the strips are connected only at the ends the buckling forces do not spread across the plate structure in the usual corner to corner manner. Moreover, the plate frame, with paste attached, has a perforated ebonite sheath vulcanised in position round each of the five strips, and this construction effectually supports and retains the active plate material, while not interfering with the free access and diffusion of the acid.

This close armouring of the five strips has permitted the use of a highly-efficient material for the forming of the positive plates, and the new construction has brought about the unusual result that the negative plates, which are of the standard flat structure, have had to be thickened to suit the better performance of the positive plates, this being a reversal of the usual practice in lead acid batteries, in which the positive plates have to be thickened to more nearly approach the life and performance of the negative plates.

Chemically-treated cedar wood is used for the separators between the positive and negative plates, and the mixture content of these separators is maintained constant, until the cell is put into service, by a skin of ebonite from the lids sealing the vent hole, so that from its assembly until actually put into service the battery is hermetically sealed. Notches in the feet of the plates locate with ribs on the bottom of the ebonite container and prevent internal movement, and screw-down fillets on top of the crates further increase the rigidity. A perforated ebonite guard is mounted above the plates to limit the splashing of the electrolyte when the vehicle is subjected to violent vibration or movement. At the moment, these batteries are made in sizes up to 296 amp. hr. for 6 volts (weight 187 lb.) and up to 90 amp. hr. for 12 volts (weight 118 lb.), and larger sizes are being developed.



Cell of new armoured plate lead acid battery designed specifically for transport work

---

B.A.P. Railcar Service.—On November 15 a railcar service was introduced between Mendoza and San Juan with the Ganz type of car built in the B.A.P. shops under the direction of Mr. R. E. Kimberley, the Chief Mechanical Engineer, and fitted with power and transmission equipment built in Hungary. Five days before the inauguration a train made up of three of the cars coupled together was run non-stop from Buenos Aires to Mendoza, 660 miles, in 10 hr. 29 min., at an average of 62¾ m.p.h.

Italian Railcars.—The Ansaldo Company, of Genoa, is building six double-bogie railcars, three with oil engines and three with producer gas equipments. They are to have Mylius mechanical transmission, and 56 seats, a luggage and postal compartment, a lavatory and two driving cabins will be arranged in an overall length of 72 ft. Electro-magnetic remote control, for multiple-unit working, has been adopted as standard for future construction by the Italian State Railways, and numerous diesel railcars now being built by Fiat and Breda are being fitted with it.

Brazilian Railcars.—The four double-bogie railcars built in the shops of the Mogyana Railway are now in service. They have Leyland 130 b.h.p. oil engines and Leyland's Lysholm-Smith type of hydraulic torque converter. There is seating accommodation for 38 passengers, and the fully-laden weight is 17 tons. A goods wagon or light trailer can be hauled. The design of these cars was described and illustrated in the issue of this Supplement for February 21, 1936. The Parana-Sta. Catharina Railway has ordered two double-bogie metre-gauge cars, each with a 150 b.h.p. M.A.N. oil engine and Mylius mechanical transmission.